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WILLIAM H. KING, M. D., EDITOR

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ORIGINAL ARTICLES.

LUPUS VULGARIS.

BY A. C. GEYSER, M. D., NEW YORK CITY.

A chronic disease of the skin, and sometimes of the mucous membrane. Characterized by formation in the connective tissue of nodules of granulation tissue. It passes through a number of clinical phases and terminates by ulceration or atrophy with scar-formation.

It is now universally conceded that the bacillus tuberculosis is the cause. While it is true that it may be difficult to find it in some cases, Koch and others have demonstrated that, if the search is reasonably diligent, the bacillis can be found in more than ninety per cent.

The bacillus tuberculosis usually finds entrance to the skin through some abrasion or external wound; or it may effect invasion through blood and lymph channels, from within, to some point where, on account of trauma or other agency, local resistance has been enfeebled.

It appears as small nodules which, causing little or no pain, but refusing to heal, spread at their periphery, sometimes rapidly, sometimes slowly, until they present an unmistakable picture.

The whole course of lupus vulgaris is usually very slow, often lasting twenty or thirty years. If a spontaneous cure occurs it is not until the disease has wrought irreparable destruction of the parts attacked, leaving hideous scars, obliterated passages, and deformed limbs to render life all but intolerable for most people.

Pathologically, then, lupus vulgaris is a local tuberculosis of the skin. The essential lesion is a new growth resulting from the irritation caused by the presence of the tubercle bacillus. The process begins in the deeper layer of the cutis. The nodules displace the bundles of fibrous tissue; and as they increase in size they grow upward through the skin, destroying its component elements by pressure, so breaking through the papillary layer, and emerging on the surface, where they are covered only by the epithelium, more or less translucent according to its thickness.

Microscopic sections of this tissue present all the peculiarities of tubercular tissue found anywhere.

TREATMENT.

The treatment has not been very satisfactory. Most textbooks inform us that, in a large percentage of cases, in spite of all we may do to overcome this disease, the patient is doomed to suffer indefinitely.

We will review a few of the more prominent methods of treatment.

Internal medication may be at once discarded as ineffective, showing no specific influence upon the disease.

Tonics of various kinds are admissible only for their general invigorating effects.

Local treatment then must be resorted to.

Application of dusting powders or ointments, some soothing, others containing escharotics; lotions, plasters, and pastes, injections, caustics, such as silver nitrate, carbolic acid, chromic acid, scarification, and excision, all of these, and others, have been tried with more or less, usually less, benefit to the patient.

Such is the history of lupus vulgaris under drug therapy.

Four cases that have been encountered within the past year are presented for consideration. Three of them were of a mild character. One was of six months', one of a year's standing.

Case 1 was treated with the x-ray. In a plate of sheet lead an aperture was cut corresponding to the dimensions of the affected area upon the patient's face—about the size of a 50-cent piece; the tube was adjusted within two to three inches of the affected part; the sheet lead was interposed, the diseased area being exposed through the aperture; the current allowed to flow from ten to fifteen minutes; this recurring every other day. Twelve such treatments sufficed to effect a cure.

Case 2. While the disease had been of longer duration it had not made the same headway so far as expansion of area was concerned, the diameter being about one inch. Being subjected to the same treatment as Case 1, signs of improvements were observed after the seventh treatment. By the sixteenth treatment it was entirely cleared.

While both of these cases presented the clinical picture of lupus vulgaris, there has since arisen doubt of their true character. They cleared up too quickly and too easily.

When Case 3 arrived, in March, 1900, it presented every clinical point, and had the advantage of eight years' standing, and had resisted treatment by all the methods known, all having failed to benefit the patient in the least. It was therefore deemed desirable to obviate any possible error in diagnosis, and by arrangement the patient called when Dr. F. M. Jeffries, pathologist and bacteriologist to the New York Polyclinic, and other medical gentlemen were present. Cocaine anæsthesia was produced in a typical-looking tubercle, and with forceps and scalpel a portion was excised and delivered to the pathologist for examination. One week later the patient was presented before the Medical Society of the Borough of the Bronx, where Dr. Jeffries kindly brought and showed the slides under the microscope, and his report in the case, as follows:

PATHOLOGICAL REPORT.

DR. ALBERT C. GEYSER:

Examination of the tissues removed by local anæsthesia from the left cheek of the patient demonstrates the lesion to be that of lupus vulgaris. Small non-vascular nodules appear, which here and there coalesce and are made up of groups of epithelioid cells. The epidermis extends downward by processes into the deeper structures. Giant cells were not found; but tubercle bacilli were discovered after prolonged search.

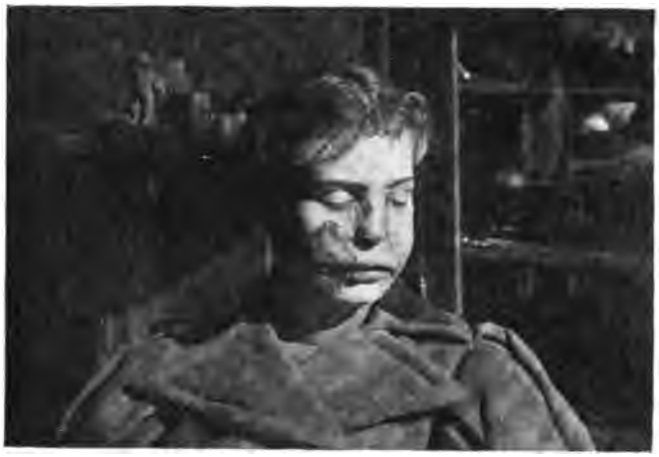
Respectfully yours,
F. M. JEFFRIES.

The report substantiated the clinical history of the case, and all of the gentlemen present agreed upon the diagnosis of lupus vulgaris.

Treatment in this case was identical with that of the previously described, up to the tenth séance. A severe dermatitis then developed upon the back of the right hand, which she had been in the habit of resting upon a small table upon which stood the tube-holder. The dorsum of the hand was markedly swollen and intensely red. There was complaint of a severe burning pain. In a few days blebs formed, very much after the manner of an ordinary burn. The hand was dressed with zinc stearate dry, and kept so with ordinary gauze and bandages. Immediate improvement resulted. The pain was mitigated, swelling disappeared, the skin exfoliated in large patches, being at once replaced by sound skin underneath. Four weeks later ridges appeared across all the nails of the affected hand, showing the effect of trophic disturbance to the matrix during the burn.

A rather noteworthy condition here made its appearance. The index finger on the affected hand had always been swollen, stiff, and more or less sensitive to manipulation. It had the decided appearance of a tubercular joint. The pain and stiffness somewhat disappeared; even the contour changed. However, a peculiar appearance, different from all the other fingers, remains.

At the tenth séance little, if any improvement, could be observed in the condition of the face. The patient, however, insisted that the inside of the mouth and nose were improving. An obstruction in the nasal passage, interfering much with breathing, was free. The patient stated that the swellings, tubercles, and the hard nodules on the inside of her cheeks and lips were disappearing. She felt as though she had more room in which to move her tongue. She could pass her tongue between her teeth and lips, something which, for years, she had been unable to do.



Illustrating Lupus Vulgaris before Treatment.

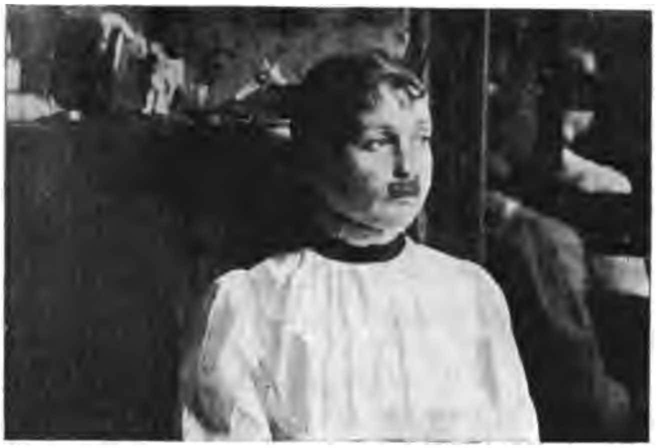
Fearing further trouble in the way of a dermatitis elsewhere, in a patient who had thus demonstrated at least a susceptibility, it was deemed advisable to try other means.

Bearing in mind the results obtained in other skin lesions with the static spray, it was resolved for a time, at least, to substitute this and note effects. The change was made at the eleventh séance.

At that time and thereafter the patient was subjected to the static spray. She was seated as usual on the insulated platform and connected with the negative pole of the machine. The positive was grounded, then taken from the ground by gas pipe or water pipe, and led to a stand holding a sharp-pointed wooden electrode, such as is usually furnished with the machine. The point was then brought to within one or two inches of the part to be treated, and the spray was allowed to act for from ten to fifteen minutes, treatment recurring upon alternate days.

Marked improvement ensued, even from the first spray treatment. This was continued to the eighteenth treatment, when an intermission of two weeks intervened, to see if the ground gained would be maintained; or, if improvement would continue, or relapse ensue, in absence of treatment.

During the first week of cessation no change was manifested. About the tenth day the whole affected area appeared to grow worse and relapse to its former state. The patient suffered excruciating pain all over the face, especially in the upper and lower lips. So severe was the pain that for three days and nights the patient was unable to eat or sleep. The pain became unbearable, and the patient begged that treatment be resumed.



Illustrating Present Condition of the Case.

Upon resumption of treatment all pain immediately vanished. The patient was able to sleep after the first renewed treatment with the spray.

The treatment described has been continued, averaging, since, about twice a week, except when humidity was too high when the machine becomes non-effective (refusing to operate.)

Case 4 was a mild one. The patient objected to microscopic examination. After the sixth treatment with the spray, rapid improvement having been manifested, the patient left for the country and was lost sight of, and the results are therefore unknown.

The points of interest developed are: First, the disease in question is tubercular; the bacillus tuberculosis must be destroyed before cure or improvement may be hoped for. Not only improvement, but cure, has been accomplished. Manifestations of tubercular diseases differ only according to the organ or structure involved. It was satisfactorily demonstrated that the tubercular processes of the mucous membrane were more quickly and easily influenced for improvement than the more accessible outer portion of the face. Even the conjunctiva, which was under ocular observation, shared in the healing process simultaneously with the mucous membranes of the mouth and nose.

Hence the hypothesis: If tuberculosis in one form is favorably influenced by an electric current of a certain type, may we not hope in the near future, by proper selection of current and application, to cope with, or at least hope to ameliorate the ravages of that scourge to mankind, "Tuberculosis pulmonalis"?

Second, the substitution of the static spray for the x-ray, thereby not only being enabled to avoid x-ray burns with their pain and consequent lesions, possibly permanent loss of hair, but becoming possessed of an agent fully as effectual and equally as rapid in the production of a cure.

History of Case 3, as written by the patient:

I was born in the City of New York, November, 1882. Both of my parents died when I was quite young.

I was in good health until I was nine years old. During February, 1891, I noticed three small pimples on the tip of my nose. When they did not heal I tried several kinds of salves; but instead of healing, they grew into one large sore and gradually spread over the whole nose.

I consulted our family physician, who told me it was due to impure blood. After treating it for one year without any sign of improvement, I was directed to the Vanderbilt Clinic. There a physician told me that my trouble was chronic eczema and would take a long time to get well. I was treated there for eleven months, the disease getting worse instead of better. At this time I was referred to another physician. He did not state what my trouble was; but after trying a number of salves and internal medicines for seven months, I wrote to a doctor in Wisconsin. He sent altogether nine bottles of medicine, which I took, but never saw any effect.

In 1894, three years after the first pimples appeared on the nose, one appeared on each side of the upper lip. They went through the same process as the pimples on my nose, and spread over the entire upper lip. Now I began to have new trouble; I could not eat solid food because the upper lip was covered with a thick crust that would crack open and bleed, and become very painful. I was obliged to leave school on account of the appearance of my face. I could not go to bed; for as soon as I would lie down the lip would crack open, bleed, and pain; so I was obliged to sleep sitting up in a rocking chair.

I was sent to another physician who gave me a salve and thought that it would spread no farther; he thought it was ringworm, but it did grow worse, and at the end of six months' treatment I went to the Skin and Cancer Hospital. I was given medicine and plasters. These plasters were put on fresh each day and forcibly pulled off. This was extremely painful and caused the disease to spread faster; so that, after eleven months, the sore had spread to the lower lip and chin.

Next another doctor applied some salves to all of the affected part. I tried this for nine months; but the disease kept on spreading; and now swellings appeared on the inside of the cheeks, lips, and nose. I could not blow my nose without having a severe nose-bleed; I could eat no solid food because I could not open my lips far enough to put it into my mouth; and if that could have been done, I could not chew the food on account of the lumps and swellings on the inside of my cheeks and lips. So I was obliged to live on soups, beef tea, coffee, milk, and crackers; and this I had to draw through a glass tube. Finding no relief from all I had tried so far, I gave up treatment altogether, my disease slowly getting worse. In 1899 I contracted erysipelas on that part of my face, neck, and scalp, that was not affected by the disease. The physician who cured me of this told me (for the first time) that I had lupus of the face, and that there was no cure for me.

By this time the disease had spread over the whole of my face, one eye was swollen and closed, the other eye became so weak that I could not see to read or do fancy work any more; and I expected to become entirely blind.

Beside the different courses of treatment mentioned above I visited a number of clinics and dispensaries, and tried all kinds of medicated soaps and ointments.

In March, 1900, I began treatment with Dr. Geyser. All medicines and salves were stopped; and nothing but electricity has been used on my face up to the present time.

RÉSUMÉ OF DISCUSSION.

Dr. Geyser: Case 3 was presented to the Medical Society of the Bronx while it was in its worst condition. I agreed that no medicines or salves should be used in the case. At that time her food consisted of soda crackers broken into sixteen pieces, one of which had to be forced between the teeth. To-day she eats the same as anybody. For two and a half years she lived on fluid food, and had to take it through a glass tube. The x-ray treatments were stopped on account of the bleeding from the mouth and nose. As to the theory of the mode of action, I am hardly ready to put one forth. It is possible, of course, that the electrical treatments started up a molecular activity. I find there are fifty-eight different varieties of lupus; but there is only one lupus vulgaris.

Dr. W. H. King: I believe the tubercular germ is very easily destroyed if you can get into contact with it. I have seen tubercular conditions of the skin very much relieved, in fact cured, by applications of sulphate of copper. As to the action of the x-ray we know little about it. We do not whether it is germicidal or not. We know that the static spark or spray sets free ozone. We also know how destructive oxygen is to germ life. Is it not possible that this is the reason of the favorable outcome of the treatment? The same theory would apply to the treatment of these cases by electric light or by concentrated sunlight. Ozone is set free in each instance, and may be the healing agent.

Dr. Hills Cole: In connection with this case it is interesting to call to mind the work being done by Finsen, of Copenhagen, and in Brooklyn in this country. Here the agent is concentrated sunlight or electric light. In both instances ozone is produced.

Dr. Dieffenbach: I would like to relate a recent experience with what I believe to be a case of lupus. Electricity could not be used on account of the distance of the patient from the city. It was a chronic case; there were crusts; and it had been treated by a number of physicians before I was called in to look at it. From its history and symptoms I judged it to be a case of lupus; and I suggested to the man three weeks ago that he take a simple magnifying glass and concentrate the sun's rays upon it three or four times a week, continuing the treament four or five months. When last I saw the case the growth had apparently ceased; there was no further invasion of the tissues. Just before leaving for this meeting, I received a letter saying that the growth had practically healed, had dried up, and that the patient felt he was well, but would continue the treatment another month to make sure.

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LUPUS OF THE FACE TREATED BY THE X-RAY.

BY DR. HILLS COLE, M. D., HARTFORD, CONN.

In presenting this paper I desire first of all to call particular attention to its title. It is not " Lupus of the Face Cured by the X-Ray." The case is still under treatment. What the final result will be can be judged only from what has already been accomplished. My only excuse for bringing it before you in its present incomplete state is the desire of our president to have a number of papers dealing with this subject brought before this meeting.

Mr. F. H. A., sixty-five years old. Fifteen years ago what seemed to be a mole made its appearance on the left cheek, midway between the eye and the ear. Being regarded as an innocent affair, it was subjected to the usual rubbing and scratching such things receive. It gradually increased in size until about ten years ago it was bean-shaped, except that the hilus of the bean, which looked toward the ear, bulged out instead of being concave. The long diameter of the sore was then about two-thirds of an inch, and the transverse diameter one-third of an inch.

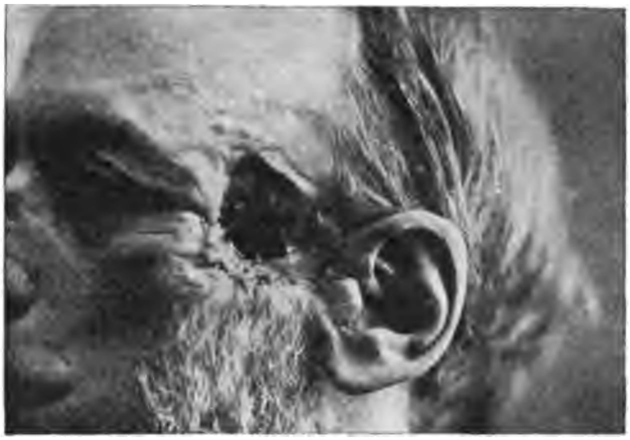
When Koch's tuberculin was first heralded in this country, the patient was treated with it by some of the professors of the Yale Medical School. No good result was obtained, however. Between that time and February of this year, when he was referred to me by his physician, he underwent various treatments; but with little success.

The general health of the patient has been good throughout his life. His family history is good. His father, when a young man, had to go South for his health; but recovered and lived to be eighty years old, and hale and hearty at that. There has been an absence of marked pain in the sore. There has been some pain in the eye; but that is probably due to the fact that the patient cannot bring the eyelids together on that side, so that the conjunctiva is constantly exposed.

The patient came under my care February 22, 1900. During the previous six months there had been a more rapid increase of the ulcer, and for three months the jaw had been more or less rigid.

When I first saw the patient the affected area was irregularly triangular, with its base line toward the eye. The base line was about 3.5 cm., and the perpendicular about 3 cm. Above the ulcerous surface the tissues were thinned and drawn down tightly over the bone. At the top left-hand corner, about 1.5 cm. from the ulcerous surface, are two small tubercles about 3 mm. diameter; and one larger one, 6 cm. in diameter, was situated a little below and nearer the eye. Outside the ulcer, on the inferior and inner borders, the skin was markedly infiltrated and rolled over on to the sore. The swelling extended somewhat toward the ear, the antitragus was infiltrated, the auditory canal was somewhat encroached upon, and the whole ear was pinched together. The ulcer was quite deep and raw. Across it ran a few ridges; and between the ridges were cup-shaped depressions.

On February 22, 1900, the ulcer was exposed to the x-rays from a soft tube through a window in a lead plate. The tube was placed about twelve inches from the cheek; and an exposure of thirty minutes given. The accompanying picture was taken after the first séance.



Illustrating Lupus of the Face.

Treatments were given three times a week until the middle of April. During this time the ulcer gradually grew smaller. The upper angle skinned over; the tubercles mentioned disappeared; and the ear straightened out a good deal.

Treatments were suspended from April 14 to the 25th, as the patient was too busy to come to me at that time. After the latter date steady progress was made until May 16, when a redness and swelling was noticed around the periphery of the ulcerous surface. Treatment was accordingly suspended until May 28. At that time the redness had decreased, the sore was filling up from the bottom, there was increased motion of the parts on moving the jaw, but the lower right-hand corner of the ulcer had sloughed out. This complication increased until a cavity was formed at the junction of the ear with the cheek which was over half an inch deep. Probably part of the maxillary gland was involved and sloughed out. The x-ray treatments were suspended for another ten days, the interval being given up to dressing the new cavity and treating the whole with the static breeze.

From that time until the present (September 10), x-ray treatments have been given twice a week, except for a short time in July, when the new abscess cavity was discharging pretty freely. I should mention at this time treatments were reduced to a ten-minutes' sitting. This cavity began to fill in nicely and the main ulcer became very much better. On August 28, however, it was noticed that the front margin had become inflamed, the parts were very sore, and pus was coming from under the front edge. A probe could be inserted for half an inch under the front margin toward the eye in two or three places. A somewhat similar condition appeared along the lower margin, which by this time had lost the puckered and rolled over condition it presented when x-ray treatments were first commenced. From then until now these new parts have gradually improved. The main ulcerous surface is all covered over, partly by skin, and partly by thick crusts. When these crusts are lifted a drop of pus will sometimes exude.

I am inclined to think that the complications mentioned have been due to the breaking down of the unhealthy, infiltrated tissue along the lower margin of the original ulcer and in front of the ear, and of the tubercles that were to be seen when the case first came into my hands. These new places are filling up from the bottom; and I believe we may expect the case to go on to a satisfactory conclusion. The face looks much better than when he first came to me.

RÉSUMÉ OF DISCUSSION.

Dr. Hills Cole: The hole in the metal plate was originally the size of the sore and included the two tubercles mentioned. Part of the hole was covered up as healing progressed. No microscopical examination of the case has been made. It was referred to me from out of town as a case of cancer.

When I first saw the case I called it lupus. Yet some of the features we are taught to look for in a case of lupus have been absent here. We expect a case of lupus to heal up in one place leaving scar tissue behind it, while it attacks surrounding parts. Such a history has been absent in this case. A number of physicians have seen the case; some have diagnosed it as a case of lupus, others have called it cancer. The static spray was used only a few times while I was waiting for the destructive effects of the x-ray to subside. There was no noticeable effects from these treatments. My reason for using the spray while waiting was that I had recently heard of a case of cancer of the tongue that had been markedly benefited by spray treatment in the hands of Dr. Monell, of New York. The little nodule now seen above the sore near the hair has been there about three weeks. One interesting feature of the history of this case under the treatment has been called to my mind by a point brought out by Dr. Geyser in one of his cases. My patient had been in the habit of steadying the lead plate with his hand during the treatment. Some time ago he noticed a roughness of the finger nails on the hand that touched the plate. The distal phalanges of the fingers came above the plate. Marked rugæ appeared in the nails; and subsequently the old ones fell off and were replaced by a new growth.

Dr. W. H. King: I believe that is a case of lupus. I would suggest that the mouth of this man might be gradually opened by the use of small graduated blocks of wood. Taking the history of the case under treatment by the x-ray, I should by all means give preference to the static spray, which not only seems to have the desired result, but will prevent any breaking down of the tissues. It has a stimulating effect and will tend to build up.

Dr. A. C. Geyser: The difference between the history of this case and most others is due to the fact that in the parts attacked there is little tissue to heal. In thicker parts of the face only the superficial tissues are affected; here the ulceration has gone right down to the bone. I should unhesitatingly say this is a case of lupus vulgaris, and treat it as such. I should certainly use the spray. A wooden electrode brought within one or two inches of the face should give off a good strong positive spray for ten or fifteen minutes at a time.

ON THE APPLICATION OF ELECTRICITY IN MEDICAL AND SURGICAL PRACTICE.

BY H. LEWIS JONES, M. D.

Current from the Mains.—After its introduction into commerce the current of the electric-lighting mains was quickly introduced into medical practice, and we make large use of it in the electrical department of St. Bartholomew's Hospital, which is connected with the mains of the City of London Electric Lighting Company. The current impulses from the alternating mains have a physiological action resembling those of the induction coil; that is to say, the effect upon nerve and muscle is to produce a permanent contraction so long as the current is applied. But it is superior to the induction coil in being a less violent stimulus to nerve and muscle by reason of the more even and gradual rise and fall of its waves. Larger currents can be borne than from the induction coil, and, judging from its effects in a long series of cases, it appears to be more thorough and more useful in its effects. Nearly all the cases formerly treated by the induction coil at the hospital are now treated by the current from the mains, the voltage being lowered to suit the requirements of the case (to about ten volts as an average), and indirectly we have gained largely in that the department is now free from the noise of eight or ten induction coils all vibrating and buzzing at once. Formerly the effect of that noise during a long afternoon was most trying. There is one marked difference in the effect of the alternating current which limits its use, and that is that if applied in the ordinary manner through moistened electrodes to the surface of the skin has a peculiar, disagreeable, burning effect. The more thoroughly the skin is moistened the less this is noticed, and when the current is conveyed to the patient through the medium of water, as in a bath, this disagreeable cutaneous effect disappears entirely. Consequently a mode of treatment by means of baths and the sinusoidal current has been developed to a very considerable extent and with decided advantage to our patients. Large numbers of our cases are cases of paralysis of the upper limbs from injury or disease of the nerves of the upper extremities, and for these we use an arm-bath. The arm-bath is a stoneware trough, of suitable shape, having a metal electrode at each end; it is filled with warm water into which the patient plunges the forearm and hand. The use of hot water as a medium for conveying electricity to a patient has many advantages. The current is much better borne, and therefore a stronger current can be used. Manipulation of the electrodes and personal handling of the patient are done away with and the affected part is kept warm during the application. For these reasons we use it largely, and I continue to advocate its use as one which again is likely to increase the popularity of electricity among the medical profession because it tends to simplify its mode of application. In addition to small local baths for parts of the body we have a large bath in which the whole of the body is immersed; and for general morbid conditions, as distinguished from local ones, the electric bath with the induction-coil current, or, better still, with the sinusoidal current of the mains, is an extremely useful contrivance. In that section of medical electricity which comprehends general applications for general systemic diseases—a field of work which is only now being thoroughly explored—the electric bath is perhaps superior to any other mode of applying general electrification. The other modes of doing this are by the statical machine or by the high-frequency and high-potential methods of Tesla and of D'Arsonval. The chief advantage of both these latter methods is that the patient need not disrobe; but, on the other hand, the electric bath has the great advantage that the currents which are being used can be more readily measured and adjusted to suit individual needs. Chance very largely decides the choice of one or other of these methods of general electrification. Whereas the sinusoidal current and the bath suits one medical man best, the other forms may be more convenient to the conditions of practice of another one. The electric bath, unfortunately, has been rather under a cloud during recent years, in this country at least, by reason of its association with those peculiar " massage " establishments which sprang up so thickly in London a few years ago. Now, however, most of these establishments have disappeared, and one may venture to speak of the definite advantages of the electric bath without feeling that one's words may reappear in the columns of some journal in association with advertisements of undesirable houses. At St. Bartholomew's Hospital, excluding arm baths, about one thousand baths, mostly with the sinusoidal current, are given each year, particularly for diseases like debility, rheumatism, sciatica, neuritis, lead poisoning, and various forms of paralysis. No electrical department can be considered properly equipped without the electric bath, for in many morbid states its action is most valuable. The bath with direct current has also certain useful applications, although not so many as the induction coil of the sinusoidal-current bath. The direct-current bath, local or general, is useful in the relief of gout, rheumatism, sprains, chronic inflammations, and generally as an absorbent for the removal of fibrous adhesions or thickenings in or about the joints and limbs. It is also indicated in painful states when a varying current is too stimulating to be well borne, as, for example, in acute sciatica, neuritis with pain, and so on.

The alternating current of the mains also lends itself extremely nicely to such uses as for galvano-cauteries and for the small exploring lamps used by surgeons, and where alternating current is laid on they now for the most part have small transformers for use in this way. Instruments containing lamps and telescopes are now used for examining the interior of such cavities as the bladder and the stomach, which previously have been inaccessible to the sight, as well as for the illumination of more accessible parts, such as the throat, the ear, the nostrils, etc.

The arrangements at St. Bartholomew's Hospital for the distribution of our current from the mains consist of a transformer, tapped at intervals in its secondary winding and led to a row of binding-screws, from which any voltage, between half a volt and fifty volts, can be taken at will. The three rooms in which treatment is given are wired in three circuits as for electric lighting, and the voltage required can be switched on to any of the three rooms from the transformer. Thus we have at command low-voltage currents for galvano-cauteries and small lamps, and higher voltage currents for applications to patients. We use three or four volts for cauteries, eight or ten for lamps, and from ten to twenty for the baths. Several of our old sledge-pattern induction coils with sliding secondaries are now converted for use as subsidiary regulating devices for the baths. I cannot say much of the use of direct-current mains in medical practice from personal experience. Although I have been instrumental in connecting three places to the lighting mains I have never been in touch with direct-current circuits. The use of the direct current from the mains for applications to patients and for other applications requiring low voltage is carried out either indirectly by means of charging accumulators from the mains and using them, when disconnected, for the patients, or else by means of shunt resistances. The latter method is to provide a resistance of several thousand ohms, which is connected across the mains. The resistance is a bare wire coiled on a support, and is fitted with a traveling contact-shoe, which can be moved so as to tap the windings at any point. The patient is arranged in a shunt circuit in parallel with any convenient length of the resistance. When only small currents are required a lamp is arranged permanently in series with the wire resistance. The slope of potential, which can be tapped at different points by the movements of the slider, permits fine regulation of current in the shunt or patient's circuit. With shunt resistances of suitable magnitude current can be obtained for treatment, for working induction coils, or for galvano-cauteries. In the latter case the waste is considerable, and it is my belief that an accumulator charged through a lamp would be much better, but in many cases the shunt circuit is preferred, in spite of its waste at the rate of more than a horsepower, whenever ten amperes are wanted. Possibly something like a step-down induction coil might be devised for heating cauteries off the direct-current mains. One of the drawbacks of electric-light supply is that those who have continuous current laid on cannot also have alternating. And so a medical man residing in a district supplied by direct current will have to generate any sinusoidal current needed by means of a motor dynamo. These instruments can be bought and are in use. On the other hand, a medical man supplied with alternating current will often sigh and wish that he could easily generate for himself a little continuous current. And here is a point which perhaps might be worth the attention of this society—viz.: the contrivance of some simple rotary converter which could be attached to a lamp socket in a house supplied with alternating current, and which would give out continuous current sufficient to recharge a portable accumulator from time to time. Not much would be wanted and perhaps it is just on that account that the instrument I have indicated is not easy to get; presumably it would not pay to make it. Still, a little rotary transformer, which would give out, say, an ampere at ten volts of continuous current would be welcomed by many medical men who live in districts of alternating supply. The mechanical efficiency of the machine is in no way important, considering the smallness of the needs. That which would be important with such an instrument is that it could be left to run for periods of an hour or two at a time without needing its owner to stand over it and watch it, and that it would not become overheated or make a great noise.

The Statical Machine.—This form of apparatus—the first introduced into medical practice—is showing very decided signs of a revival. In the United States the statical machine is already very largely employed, and I am told that in New York alone there are no less than three firms busily engaged in turning out statical machines at the rate of two or three a week. Those who are only acquainted with the effects produced by small statical machines can have no idea of the difference between small and large instruments of this kind. The effects produced by a large statical machine are most decided, and it is only necessary for one to experience them once to see that treatment by them is by no means a mere treatment through the imagination. The most apparent effects of the statical machine are the profound and peculiar cutaneous sensory stimulation which can be produced by it and the forcible muscular contractions which can also be produced by it when the administration is in the form of sparks. Its special field of usefulness probably lies, first, in its action as a general excitant; secondly, in conditions of neuralgia and other superficial pains; and thirdly, in the conditions of muscular pain. In all these cases it acts quickly and thoroughly. It is quite common to receive a patient stiff and lame from lumbago or muscular rheumatism and to see him leave in ten or fifteen minutes quite free, for a time at least, from his lameness or his stiffness. All this promises to be extremely valuable. The difficulty of understanding how a simple electrification by the static machine can influence the body makes many of us disinclined to believe that there can be any effect; but after watching cases carefully for some time I can now say with certainty that some direct action does take place. I have only had a proper static machine for a year and a half, and therefore still feel rather a beginner with it. A very interesting matter is that, whereas, on the other side of the Atlantic, the influence-machine which is used is invariably a modified Holtz, on this side it is the Wimshurst which is considered the best. The American Holtz machine certainly has been developed into a most beautiful instrument, and although it has one drawback when compared with the Wimshurst—that of not being self-exciting—that is a point so easily got over by means of a small accessory exciting machine in the corner of the case as to have no real importance. Size for size, I am disposed to believe that the Holtz gives a better output than the Wimshurst. It appears to be a more cheaply constructed machine and needs no counter shaft or cross-belts. Recently a large American Holtz machine has been presented to St. Bartholomew's Hospital, so we shall have an opportunity of testing and of comparing its work with that of a large Wimshurst machine which I have recently had constructed for my own use. As a good Holtz machine is, so far as I know, a curiosity in this country, I shall have much pleasure in showing our machine to any members of the institution who might wish to see it. The accessory apparatus and the technique of the statical machine have been very greatly simplified by the work of American physicians.

The application of high-frequency currents to medical practice has not had much extension. In France it is used a little.

The currents are taken from leads connected to the ends of the primary helix and no secondary coil is used. An induction coil is generally used to charge the Leyden jar condensers of the system. The applications are either by a sort of spark or brush discharge from one terminal to the patient; or the patient lying on a couch is attached to one pole, the other being connected to a sheet of metal under the couch. This is called the condenser bed. Finally the patient may be inclosed in the actual helix connecting the jars and his body thus made the seat of induced currents by "auto-conduction." Its chief applications have been as a mode of general electrification, but the brush discharge is also applied locally to the skin, and has seemed efficacious in curing certain skin diseases.

Ozone.—The use of electricity for generating ozone for medical purposes is attracting some interest. It is not so much that these applications of ozone are entirely new as that the apparatus is now becoming sufficiently improved to make its applications easier. But the rapid development of electricity in so many directions of late years has given medical men just at present so many fresh things to handle that ozone in its medical applications is, as it were, waiting until someone has time to attend to it. The workers in medical electricity, in this country at least, are so few.

Perhaps the most striking of all the applications of electricity to medical work in recent times has been due to the discoveries of Professor Roentgen. The introduction of the X-rays has revived very greatly the interest in medical electricity. The Roentgen-ray work makes a very considerable addition to the work done in our electrical department at St. Bartholomew's Hospital, as it is in almost daily use for purposes of diagnosis in surgical cases. Physicians hitherto have paid but little attention to Roentgen rays, but its application to the diagnosis of diseases of the chest must be mentioned as perhaps one of the most promising things for the future. Certainly it is possible to diagnose pulmonary consumption and some other diseases of the chest more satisfactorily, and at an earlier state of the disease, by the X-rays than is possible with the stethoscope; and this one point alone appears to me to be of the highest importance. For example, recently I saw the X-ray photograph of a patient's chest. She was suspected of having pulmonary disease and was sent to one of my colleagues for an X-ray photograph; examination by the ordinary methods of ascultation and percussion had given an uncertain reply. But the negative taken with X-rays showed without any possible doubt of the presence of tubercles in the lung. If there were more time to spare I could go into the question of X-ray work more deeply, on the grounds of its great development by medical practitioners, the localization and stereoscopic methods of Mr. Mackenzie Davidson and others being singularly beautiful in their results; but I have the idea that most of us are a little sated with X-ray work just now, so I shall say no more except to refer to the extreme beauty of the fluorescent screen effects which are given by large static machines.

ELECTRICITY IN THE TREATMENT OF ARTICULAR RHEUMATISM.

BY M. F. WOODARD, M. D., BLOOMINGDALE, IND.

I have used electricity in a case of articular rheumatism with excellent results. The case is one of long standing. The joints were swollen, especially at the wrists and ankles, which were slightly anchylosed. There was soreness in the wrists, with a good deal of pain in the shoulder and along the median nerve. Also at times much pain along the sciatic nerves.

The patient has been troubled with indigestion for a long time. Of course my first attention was directed toward correcting this condition, which resembled catarrhal gastritis as nearly as I can tell. However, I used the positive abdominal electrode over the epigastric region and the negative sponge electrode to the upper posterior cervical region. The patient had been troubled some with vertigo, but after two treatments this disappeared and her digestion improved. In treating the upper extremities the negative electrode was placed over the enlarged joints and the positive at the posterior cervical region. After remaining in this position for ten minutes, moved the negative electrode toward the positive along the affected nerve tract.

In the lower extremities the positive electrode was placed over the lumbar region and the negative at the ankle, moving it along the sciatic nerve tract. The current used was a medium primary faradic of about one hundred and fifty milliamperes. Applied current about twenty minutes each sitting. Two treatments demonstrated to me that she was much better. The swelling in the joints is less than at first. The circulation seems a great deal better, which is probably due to improvement of digestion.

SELECTED ARTICLES.

SOME GENERAL STATISTICS OF STRICTURES OF THE URETHRA TREATED BY ELECTROLYSIS.*

BY ROBERT NEWMAN, M. D., NEW YORK.

The object of this short paper is to show that electrolysis in the treatment of urethral strictures has been continuously practiced with the same success as heretofore, and to add general statistics. The writer finds this necessary, as for several years he has said nothing about his statistics, and in six years has not read a paper on the subject before the association. Longer silence might be misconstrued by some members of the profession. Further experience has shown that there is nothing to retract, only confirming former statements of the success of electrolytic methods.

The writer has successfully used his method of electrolysis in the treatment of strictures in about two thousand cases, which is not a large number for thirty years' active service, as it would average not more than five cases per month. Seven years ago he published a compilation of 1755 successful cases in the practice of fifty-four different operators, mentioning their names, and favorable opinions of the said method. In the same number of the journal in which this was published, appeared an editorial from which the following is quoted: "The statistics accumulated by Dr. Newman, if all were reported, would cover a list of over two thousand cases of urethral stricture treated by the electric method. In the face of such a mass of positive evidence, one is tempted to explain the dissent existing by the application of the personal equation. Still, everyone has his right of opinion and free expression; and if the opponents of this method desire it, the columns of the Times and Register are equally at their service." No statements of dissent have been sent; the writer gave documentary evidence for everything stated, which was investigated and found correct by an impartial committee from this association, who reported accordingly. Many of these patients have been kept under observation, have been re-examined after years, and no relapse followed. Most of these, after twenty-five years' interval, can be found to-day stating that they have kept well, without having had a relapse. In a few instances a patient returned after years with a new ailment, mostly of the prostate or bladder, but never had a stricture in the same place, which had been cured by electrolysis. During these years the writer has never lost a patient by death while under treatment for a stricture. One patient having a stricture died from injuries received in a falling elevator, and before any treatment for the stricture had been commenced.

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* Read at the annual meeting of the American Electro-Therapeutic Association, September 26, 1900, held at the Academy of Medicine, New York.

Death, however, followed in every instance when a patient gave up the electrolytic treatment by the writer for the sake of undergoing a urethrotomy, which in these cases was never performed by the writer, but by most skillful surgeons of unquestionable ability, who did the work well. The operators cannot be blamed for the fatal result, but we must accuse the system. The causes of death in these cases were mostly sepsis and uræmia, after a secondary hemorrhage. Cystitis and suppression of urine had preceded. Nowadays the strongest advocates of urethrotomy will not promise a cure, and patients so operated on will remain patients till the end of their lives. Any incision either heals by first intention, which makes the caliber of the same size as before the operation; or if the divided surfaces are kept apart a cicatrix by granulation is the consequence, which is worse than it was before the cutting. It is useless to give the details of these cases, which were received only by courtesy of the operating surgeon, and only refer to cases known to the writer. Other methods may cure certain strictures which are simply contractions within the urethra, but it has not been proved that fibrous pathological conditions of induration, invading tissues outside the urethra, and even the corpora cavernosa and spongiosum, can be removed by cutting, divulsion, or dilatation.

Electrolysis absorbs the fibrous infiltration by the chemical action of the negative pole. The writer has often demonstrated such decompositions by electrolysis, and it is taught in any text-book on physics and chemistry. In surgery the rule is, weak currents will absorb; strong currents must cauterize and destroy tissue. Hence it follows that for the treatment of urethral strictures by electrolysis we must use a weak current, never more than five milliamperes, and depend principally on the action of a galvanic chemical absorption. Such currents never can burn.

Electrodes and battery must be made correctly and in accordance with our principles, as described in former papers. No force or pressure must be used, no hemorrhage caused, and a case never operated upon during the existence of any acute symptom. No pain or inconvenience must be produced, and the séances must not be oftener than once a week.

Is it Dilatation?—We protest against having the process of electrolysis called a dilatation or a modified dilatation. It is not dilatation in any sense, since this is an entirely different action, in which some kind of force or pressure is always used and is absolutely necessary. Any force in electrolytic applications is a great error.

To show the difference between a dilatation and enlargement, a quotation from a dictionary may be permitted here:

> Dilatation.—The art of dilating or expanding, expansion, augmentation of bulk, spreading in all directions.
>
> Enlarge.—(1) To make larger, to increase in quantity or dimensions, to extend in limits, to expand.
>
> (2) To increase the capacity of, to expand, to give greater scope to.
>
> (3) To become diffuse, to expand.
>
> (4) To set at large, to release from confinement or pressure, to give freedom to.

It will be seen that the term dilatation is not within our meaning, and by former usage reminds one too much of the gradual dilatation with sounds, which demands pressure, and is scarcely anything else than the momentary stretching of rubber which, released, returns to its former caliber. What we want is a permanent enlargement by absorption of pathological strictures.

In electrolysis the electrode passes by simply holding and guiding it through the stricture. It enlarges the caliber by the absorption, and consequent restitution of the size. This absorption of the fibrous tissues goes on gradually, removing the stricture and enlarging the caliber of the urethra until it is restored to its normal size. The operation must never be done when there is present any inflammation, hemorrhage, or discharge. Under such disadvantages failure must follow.

If there are excoriations, electricity will do harm, and such conditions must be cured first by other means.

Diagnosis is most important, and must be made so that there will be no doubt that we have to deal with an organic stricture.

Spasmodic strictures will be made worse by the galvanic current.

Other differentiations are granulations, discharges, diseases of the prostate, lacunæ in the urethra, calculus, carcinoma.

The modus operandi and the armamentarium have been described in former papers.

If failures are reported the operator has made mistakes, for which the system cannot be responsible. Recently many more successes of electrolysis have been reported and papers on the subject published. It is, among others, a pleasure to mention the excellent paper of Arthur B. Duel, M. D., in the JOURNAL OF ELECTRO-THERAPEUTICS, July, 1900, p. 185, "On the Value of Electrolytic Dilatation of the Eustachian Tubes in Chronic Tubal Catarrh and Chronic Catarrhal Otitis Media." Dr. Duel has made a valuable addition, and presents a clear description of electrolysis. On page 188 he says: "Dr. Robert Newman has demonstrated its great value in the face of most bitter opposition."

There is much truth in those lines, but it must be wondered at why such opposition is manifested, after reports of success with the method for over thirty years by many different operators. It will do no good to argue and enumerate causes. However, one good reason is the failure of our medical colleges to include in their curriculum the study of electro-therapeutics, preferring to hunt microbes and bacilli. One college faculty which has established new buildings and excellent laboratories has not fulfilled the promises given for six years, to include electro-therapeutics in the curriculum. The secretary of another great college told me that they have no battery in their laboratory.

The want of education and the need of greater appreciation of the power of electro-therapeutics is well and concisely described in an editorial in the Charlotte Medical Journal for

February, 1898, page 178. "Other failures arise from the lack of patient, correct manipulations, and from the fact that the operator is not an electric expert and genito-urinary surgeon combined." The careful, graded education for years in the laboratories in Ann Arbor, University of Michigan, under the able leadership of our Fellow Dr. William J. Herdman, deserves, therefore, our greatest appreciation and encouragement.

Many kind words have been said about this method, too many to repeat here, but only one may be permitted to show some causes of failure. Dr. H. H. Hahn, of Youngstown, Ohio, says: "There is such a thing as a special aptness for this kind of work, and when this is associated with the other requirements mentioned, the claims we have made will certainly be verified. The venerable and grand Dr. Robert Newman, of New York, who has so successfully treated hundreds of cases of stricture of the urethra by electrolysis, has been striving for years to force upon the profession at large just how he accomplishes it, and yet we find men here and there decrying the method as inefficient and dangerous, claiming that they had tried it, and in some instances exposing their abominable ignorance by admitting that they had produced cauterization, and that the treatment was followed by a worse stricture than the one it was attempted to cure. We simply say that Dr. Newman does not cauterize with his own hand, and when some fool, through his ignorance and clumsy manipulation, does so, neither Dr. Newman nor his method is responsible. It is the operator alone, and that too in spite of clear and explicit directions in every detail laid down by Dr. Newman. All we demand in this matter is fairness."

There are numerous advantages of electrolysis in the treatment of urethral strictures which have been set forth in former papers. The principal one, however, is that it cures, and once cured, no relapse is possible. The patient is not kept in bed any time, and loses no time from business or pleasure. All of which has been proven by documentary evidence during thirty years.

Drs. Holloday and Burton report successes and close their excellent concise paper as follows: "The above statements are not the wild vaporings of an excited imagination, but sober conclusions formed from a long experience, a practical structure reared upon the rock-bed foundation of the eternal, unchangeable laws of physics and chemistry, woven by man's ingenuity into the applied science of electro-therapeutics."

148 West Seventy-third Street.

EPITOMES.

INFANTILE PARALYSIS.

BY JOSEPH P. COBB, M. D., CHICAGO.

During the acute stage the treatment of infantile paralysis does not differ from the treatment of any other acute disease, and little attention need be paid to the paralysis. After the acute stage has passed the paralyzed muscles demand attention. Massage and electricity are our most valuable means of help; strong electrical currents are to be avoided because they are irritants and do harm. An important part of the electrical treatment is to exercise individual muscles that are not under the control of the will; for this purpose the galvanic current only is serviceable, because the muscles will not respond to the faradic current. The general nutrition must be maintained by a good diet, exercise and out of door recreation.

* * *

Discussing a case of spasmodic torticollis, Dr. G. F. Goldsbrough says: In the absence of hypnotism, suggestion was applied in two ways—first, in giving a hopeful prognosis and firmly pointing out that the patient could help herself by the exercise of the will; and secondly, in applying a stimulus to the muscles opposite to those affected by spasm by means of the electric current; not that the latter muscles were in any way weaker than those affected by spasm, but that through the unaffected muscles the will of the patient had to be exercised to overcome the spasm, and a stimulus in the nature of the electric shock would give confidence in the exercise of the will. The stimulus of the electric current would in reality act as a suggestion to the patient that she was stronger than she had thought herself. The adoption of such a principle as this opens up a wide field for electricity and exercises in the treatment of motor disorders in hysteria, which in the case under consideration was justified by the result, for recovery was complete.

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STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

BY WILLIAM BENHAM SNOW, M. D.,

Late Instructor in Electro-Therapeutics and Nervous Diseases in the New York Post-Graduate Medical School and Hospital.

CHAPTER I.

The growing interest in the electro-static treatment of many forms of disease arises from the results obtained, in many instances so startling that to gain the credence of a confrere often requires that he witness the administrations; and of the operator that he have confidence in the veracity of the patient, and his own diagnosis. Many physicians themselves have proved excellent subjects for demonstration.

The development of this now most valuable department of electro-therapeutics has advanced step by step with the evolution to perfection of the modern static machine. In England and on the continent of Europe, where at present no such machines are produced as the American apparatus, static electro-therapeutics is not advanced; and the physicians of this country who look abroad for advanced ideas do not easily discover progress at home. In the recent writings of Hedley, Jones, and Bordier the subject receives but brief consideration, Jones acknowledging that the American machines are superior to others.

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* Copyrighted.

Since the introduction of electricity in medicine there have been progressive improvements in methods and the development of more perfect apparatus adapted to special applications and indications. The crude galvanic batteries, made without reference to size of elements or number or arrangement of cells, and having no means for regulating the current, have been succeeded by batteries designed for special uses, and associated with rheostat for controlling and milliampere meter for measuring the current, thus enabling the operator to make intelligent and safe use of an agent capable of doing serious mischief.

With the same progress of the science marked changes in the character and utility of the faradic battery have been evolved. The first crude affairs, having short, coarse secondary coils and indifferent device for interrupting, have been succeeded by the perfected instruments, having long, fine wire secondary coils, and varied devices for fine, slow, or rapid interruptions. The perfecting of these forms of electrical apparatus have worked most striking changes from time to time in the medical mind. Principles have been set up based upon some theory of an authority, to be later disproved. Gradually the peculiar polar effects of the constant current have become established, and electrolysis, cataphoresis, and cauterization have become its chief fields of usefulness. Little is it valued to-day as an anodyne, tonic, or reconstructive alterative. Faradism has superseded it; only to be superseded by more effective currents. As apparatus has been produced generating currents of greater and greater voltage and relatively very small amperage, results have been obtained leading on to the introduction of new and more perfect machines.

The sinusoidal machine in sanatoria and office practice has effected results impossible to obtain from the faradic battery. In France the great frequency high potential apparatus of d'Arsonval is still further an advance. In 1881 Dr. Morton published the first of what he pleases to call the " spark-gap " currents, the " static-induced current "; and later, in 1899, the " wave current." Until the introduction of these static currents, administrations had been limited chiefly to spark electrization, breeze and brush discharge; all useful in selected cases. The static currents have the greatest voltage and least amperage of any currents to-day employed in medical practice, and produce many effects—especially the wave current—not to be derived from other currents.

Relative merits of currents and uses of various apparatus should be briefly considered in passing, as the body of this work will deal exclusively with static administrations. We maintain that in all cases not calling for the peculiar polar actions of the constant current, the static currents, when they can be administered, are to be preferred to all others. The great point of superiority of the wave current lies in the fact that it is a *one pole* current of high or low potential, and great or small frequency, under perfect control, painless during administration, potent for good, and not endangering the life of the patient. The patient, being insulated, is repeatedly charged and discharged from the surface of contact with the electrode, obtaining a local effect and the constitutional effects of general electrization peculiar to a one-pole current.

The *two-pole, static-induced current,* which has received much more recognition because it has been longer known, is of relatively little value, and the writer knows of no indications for its substitution for the wave current. *Static sparks, brush discharge, breeze and static insulation* each meet valuable indications, and all partake of the characteristics in common with the wave current. They are administered with the patient insulated, and are often called currents, though they are not in the technical sense of the term, the resistance of the dielectric permitting the body to become charged before it escapes.

The currents of the great-frequency, high-potential apparatus of d'Arsonval are two pole currents transformed from the street current, and of relatively large amperage, and dangerous when administered in currents of more than 1500 volts. The therapeutic effects, while surpassing all but the static currents, accomplish nothing that they do not (except, possibly, as some authorities claim, a destruction of germ life) and fail absolutely where the wave current succeeds. The apparatus is elaborate, expensive, and apt to get out of repair, as are most coils and transformers.

The current generated by the sinusoidal machine, adapted only to sanitarium or office practice, does not approach in value the d'Arsonval currents, but gives generally better results than the faradic. The current is of relatively higher voltage and greater amperage than the latter, and a much more agreeable current. It has no advantage over the wave current, and will not be called into requisition when the static machine is at hand.

The faradic apparatus, while a relatively feeble agent, will be called into service at the bedside or home of the patient where in but rare instances it will be possible to have more elaborate generators present. It will be of value in connection with a galvanic battery in testing for nerve degeneration. If a faradic battery is expected to be of service it should have not less than 1500 yards of fine wire in its secondary coil, and be provided with a fine ribbon or other device for rapid interruption. When we consider the marked improvement in these instruments over the ancient ones, and take note how greatly inferior they are to other apparatus, it is not surprising that electricity has so often proved disappointing, or that the mass of the medical profession are skeptics.

The discovery of the Roentgen ray, followed by the prompt adaptation of the static machine to its production, has given Franklinism another field, which is bound to redound to the benefit of two sets of physicians. Those who were already possessors of static machines have had thrust upon them a great aid in making a differential diagnosis, diagnosing incipient phthisis before any other examination can discern it, localizing an aneurism, stone in the kidney, the presence and site of foreign bodies, fractures, dislocations, etc., as well as its therapeutic uses in a field now becoming rapidly recognized. The other set are those who for purpose of employing the X-ray have now at hand, or may have, a means of doing very much valuable therapeutic work that could not be done as well by any other method. So true are these facts that, if for no other reason, one purchasing an X-ray apparatus should select the static machine; but there are other reasons:

1. The machine does not have the same tendency to shorten the life of the tube, due to the fact that the radiance is produced by a current of such low amperage that the heat production is reduced to a minimum, with practically no danger of melting the metal parts.

2. The radiance is far more constant and uniform, not having the flicker characteristic of the coil apparatus, which feature is invaluable in making fluoroscopic examinations of the chest.

3. In the case of the static machine there is no coil to burn out, a saving of suspense and expense.

On the other hand the coil apparatus has some features of advantage which it is but fair to name:

a. Portability.—Some inferior forms of apparatus (inferior because the generator of the current of sufficient utility is not portable) are constructed to make it possible to convey them to the patient.

b. Weather conditions, which will occasionally (not often) affect the output of current from the static machine, do not affect the coil apparatus. As will be shown in later pages, this difficulty may be entirely obviated.

We know of no other advantage possessed by coil apparatus, for a careful study of results shows that in skilled hands equally good skiagraphs are taken by either, while with amateurs, absence of fear of damaging the apparatus, either injuring the tube or burning out a coil, leaves the chances of obtaining good results in favor of the static machine.

So valuable is static electricity in treating a multitude of cases in every hospital and insane asylum in the land, and the grave mistake of placing a coil apparatus that will debar the purchase of a static machine so apt to occur, that the writer, without prejudice, interest, or bias other than the good of humanity cannot too strongly urge that the additional first cost is unworthy of consideration.

If some electrical engineer will solve the difficult problem, and manufacture a coil apparatus not apt to burn out—one which will produce the current having the very small amperage and great potential of the static currents, that apparatus will be most acceptably received.

CHAPTER II.

APPLIANCES FOR ADMINISTRATION.

The Static Machine.—Success in static administrations requires a machine constructed in accordance with right principles and of the proper materials. Many machines on the market and extensively advertised are not so constructed, and are sure to disappoint the physician who, later, sees a more perfect apparatus, or discovers, as many have already, that he does not get the results obtained by others.

1. *The Holtz machine,* with *Wimshurst* conveniently placed within the case for charging, is the best type of influence machine.

2. The machine should have at least eight properly coated glass *revolving* plates, 30 to 34 inches in diameter, if to be used for medical work and *incidentally* for X-ray work, or ten plates if X-ray work is expected to be a main *feature* as well as medical work. (Very satisfactory skiagraphs are taken with eight-plate machines.) The amperage or quantity of current generated under favorable conditions is measured by the number of revolving plates and the speed of the machine; and the voltage, indicated by the length of spark, by the diameter of the plates, and speed of the machine. (The spark generated can never exceed, and under the best conditions may equal, one-half the diameter of the plate.

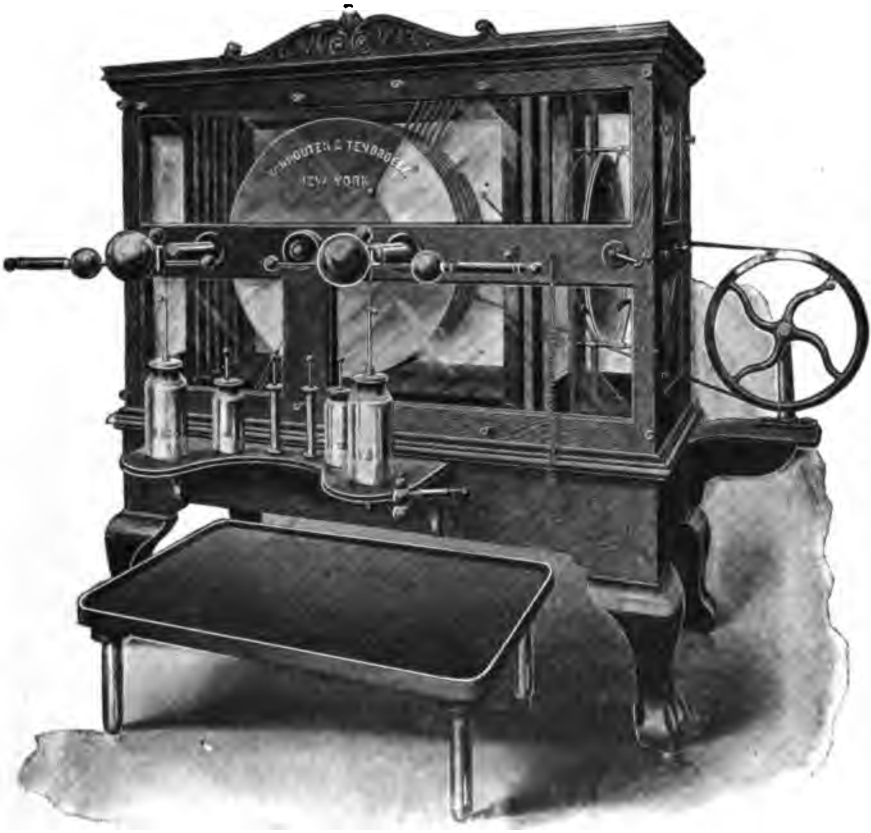
3. The interior construction of the machine should be of vulcanite where insulation is indicated, because wood is not a non-conductor of static electricity.

4. The mechanism should be inclosed, so far as possible, within a case constructed from thoroughly seasoned wood, the pores of which have been well-filled with filler, oil, and shellac, that air cannot penetrate or moisture affect it, and inclosed in such a manner as to be effectually sealed against the influences of the atmosphere.

5. The case and all exposed metals should be free from points and angles, all parts being rounded to prevent leakage.

6. The Leyden jars should be portable, and not attached to

the machine, because they are in the way, collect dust, and are of use only in connection with the little used static-induced current.



A Type of a Modern American Holtz-Wimshurst Influence Machine.

7. A provision (invaluable under unfavorable atmospheric conditions, or when, through neglect, the machine has accumulated dampness) by which the speed of the Wimshurst may be accelerated, and the Holtz, at first started at a slow speed, may suddenly be made to move rapidly to catch the charge. (See "Charging the Machine.")

8. A provision, or receptacle, for containing some chemical, as $CaCl^2$ or CaO, for drying the air in case it should become moist, will be a valuable feature and generally appreciated by the profession.

9. The insulated platform should be neither too large nor too small—about two feet three inches by three feet six inches, and provided with glass, porcelain, or vulcanite legs not less than ten inches in length, to prevent escape of electricity to the floor.

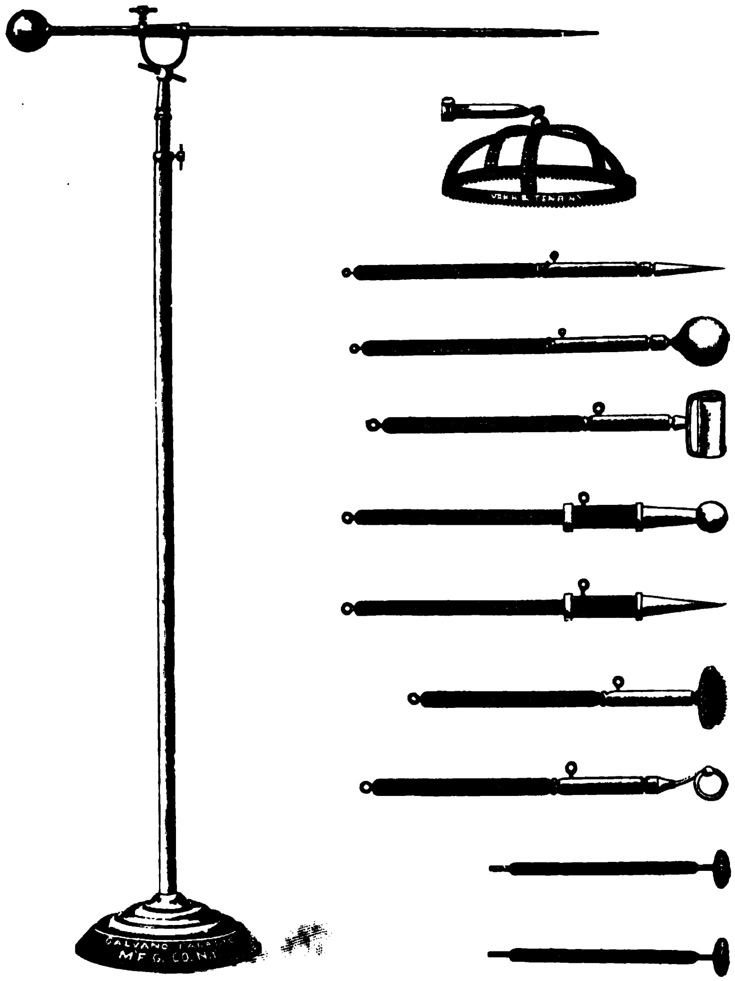
10. A test of the efficiency of a machine is not the length of spark discharged when the Leyden jars are employed, the length of spark depending on the size and coating of the Leyden jars. The frequency and regularity with which the discharges are repeated will be the test both of a machine's capacity and the absence of leakage under high tension, qualities invaluable in a machine for X-ray work and use of the wave current.

11. Only small Leyden jars are of any use in practice, and they for administering the static-induced current, unless a transformer is to be used.

12. A chair might be devised having a high back, capable of folding, and provided with wooden stirrups, for gynecological and rectal administrations.

The necessary electrodes and instruments for use are constantly increasing in number with the broadening field of application following upon the introduction of the wave current.

The common electrodes and instruments for general-purpose work should be three *ball electrodes* having diameters of 2 to 2 3-4 inches, 1 1-2 inches, and 1-2 inch respectively; *one roller* (of most value for rolling out sheet tin electrodes); one *metal-point electrode;* one *chain holder* (for holding chain during administration of the direct spark, breeze, or brush discharge; one *adjustable stand* for holding long-point electrode; one *wooden-point electrode;* and one *wooden-ball electrode,* for administering brush discharge. *A wooden electrode having a movable insulated guard,* for use within cavities, as the nose, mouth, ear, and vagina will be found serviceable in special cases. *Block tin sheets,* of different thicknesses, of which 22 gauge and 32



Standard, with Combination Ball-point electrode and Crown, and Set of Electrodes.

gauge will be found most desirable, may be easily cut with a pair of shears into shapes and sizes indicated for various applications of the wave current. For inter-uterine, vaginal, rectal, and urethral administrations of the wave current and static-induced current *special electrodes* are designed, and will be described later. *A rectangular metal plate* (aluminum) twelve by fifteen inches, having a chain attached, is of sufficient value to call for its addition to every outfit. *The static cage,* while of doubtful efficacy, may be demanded by some. Two *sponge electrodes,* for using the static-induced currents, are usually included. *A current controller,* for administering the static-induced current, will make the administration of that current much more agreeable and effective. A *crown* or *tassel electrode,* for administering breeze to head, will be demanded by some. A *muffler,* for deadening the sound during the administration of the spark-gap currents, must be at least six inches in diameter, and made so that it can be dried daily. Rheophores, for connecting the wave-current electrodes with the machine, having a sliding device for shortening, and clasp for holding the electrode, will be found a great convenience.

The appliances for use in skiagraphy will be given in another chapter.

An *electric motor* and *current controller,* a *water motor,* or *gasoline engine* (which last may be placed in the cellar) will be found indispensable if the best results are to be obtained. It is impracticable and impolitic for a physician to endeavor to turn the machine himself, and the presence of a man is often objectionable. A current controller, to be satisfactory, must be capable of regulating the motion gradually, from a very slow to a very rapid rate of speed, that the operator may thus regulate the frequency and potentiality of the spark, the length of the spark, or the radiance of his X-ray tube. A *hygrometer,* to determine whether a deficient output of the machine is due to humidity of the condition of the machine, will often prove a satisfaction, but is not a necessity.

There may be various other attachments suggested, but the above will meet most demands.

154 West 34th Street.

THE ELECTRICAL TREATMENT OF A FEW SEXUAL DISTURBANCES.

BY LEWIS WILLARD READING, M. D., PHILADELPHIA.

Without fear of opposition I make the assertion that the group of complaints or symptoms associated with sexual derangements are particularly slow to yield to the usual methods of treatment; and therefore, on account of the greater success of electricity as a remedy, any enlightenment upon the use of such remedy should be extremely interesting to the medical profession.

Of the great variety of complaints which are presented to the physician, many will refer to some derangement of the sexual functions. Some cases are freely communicative, particularly those who have a fully developed debility; while others, particularly the young, who from some appreciable physical failure or from some subjective symptom are positive that such a failure will certainly occur, consult you for pain in the back, neuralgia, or some disorder, which leads easily and naturally from the ostensible to the real object of the visit.

Both classes of cases have fixed and peculiar ideas about their condition, which makes the treatment often very difficult. They have perhaps consulted their family physician, who has prescribed various drugs, and probably electricity, but without the desired result.

In addition to change of habits, mode of living, proper medication, and an encouraging state of the mind, resulting from the inspiration of the prospect of a speedy relief to be derived from treatment, you will find electricity an important factor in their restoration.

In many cases there will be a lowered functional activity of the entire nervous system, this being caused by the mental consciousness of an increasing loss of functional activity or the fear of the complete abolition of the virile power. In others we will find both a local and general debility, resulting from a continued stimulation of certain nerve endings and a consequent exhaustion of the brain and spinal centers controlling the parts involved.

The neurasthenic condition is probably the first that will attract your attention, and whether it is the result or cause of the debility matters little, as by its removal you will greatly enhance your patient's progress towards recovery. The form of neurasthenia makes no particular difference in the method of treatment to be employed, as what we desire to accomplish is to remove the irritability or increase the activity of the brain and spinal centers. Other forms of treatment may be used; but I find that galvanism, by its catalytic and alterative effects, will best meet the indications. The chief aim is to quiet the nervous irritability or increase the nervous activity.

If we wish to lessen the irritability, we use the positive pole with an electrode composed of pure tin covered with absorbent cotton, two inches square, and placed on the vertex. This is the most suitable position to apply it, as often vertigo and even fainting is produced by an indiscriminate application. The negative electrode is a convex button about two inches in diameter, and is placed subaurally on either side. The current strength should be two milliamperes. The negative electrode should be gradually moved down over the cervical sympathetic nerves to the first dorsal vertebra, and, the current being increased to five milliamperes, continued on each side of the spine to the last dorsal vertebra. The current is now shut off, so as to avoid any shock to the patient, and the positive electrode is placed on the inferior cervical region of either side, the negative being traced over each dorsal nerve, this method having a gentle soothing influence over the sympathetic ganglia. If you find it necessary to increase the nervous activity, you simply reverse the position of the poles.

This treatment produces a momentary contraction or tonic state of the vascular muscles, and also has a certain effect on the trophic nerves, thus producing changes in other organs and tissues of the body, " an organic metamorphosis and modification of nutrition, which constitutes a part of the catalytic effects." The whole appearance and condition of your patient undergoes a marked change after a few of the preceding treatments. The complexion becomes healthy from improvement in cutaneous circulation, the digestive organs increase their activity, the mental depression is removed, and your patient experiences a general feeling of buoyancy, all of which renders him in much better condition to institute treatment for the local disturbances.

Among the local disturbances the most prominent and frequent is the loss of the erectile power. It is the one which most concerns your patient and brings him to his physician at once. " To him it is a single fact, to his physician it is a derangement of a complicated system of parts and functions both local and general." A fruitful cause of this condition is excessive and arduous mental application in men practicing complete continence, where the mental activity is expended in other directions, and where from mental exhaustion they have become sexually morbid. Some cases have complete loss of the normal physical reflexes; while, in others, the sensory nerves will respond to stimulation. This proves that the efferent nerves in the spinal path have not been impaired entirely; and hence the physical reflexes are retained to a certain extent.

We may have two conditions of the penis associated with the loss of erectile power. It may be pale, shrunken in size, and cold or red, flaccid, elongated, and temperature normal or augmented—a passive engorgement. The first is caused by the irritation of the vaso-motor centers, due to the excessive sexual excitement before the exhaustion of the nerve centers, and the latter by the exhaustion following the irritability of the vaso-motor centers. In the former we find an overexcitement of the vaso-motor nerves controlling the vessels supplying the erectile tissue and so influencing the dilation as to prevent the engorgement of the cavernous bodies, thus rendering erection impossible. Therefore we have a lessened blood supply to the secretory organs, a diminished secretion, and a consequent loss of this source of stimulation. In the latter the vaso-motor dilators may be sufficiently active to enlarge the cavernous sinuses and increase the flow thereto, but the muscles not being sufficiently nourished are not active enough to contract and retard the blood from returning. Hence we have a soft glans and easily compressible body, a slight increase in bulk, and the secretions of the coronary glands are unpleasantly augmented.

BOSTON MEDICAL LIBRARY

Different forms of treatment are necessary for the several conditions. When due to excessive mental application we desire to stimulate the nervi erigentes and upper nerve centers. To meet these requirements we use an ascending current, placing the negative pole on the back, sides of neck, and vertex; the positive pole on the perineum, third and fourth sacral nerves, and the genito-spinal center of Budge at the fourth lumbar vertebra successively. Employ the current about five minutes at each place, with a current strength of about five milliamperes. This will stimulate the cortex and quicken the responses of the lower spinal centers.

To remove the irritation from the cortex, you would employ the same method as for neurasthenia, mentioned or described before. Good results will also follow the stabile application of the positive pole to the lumbar region, using an electrode four by four inches; and the negative pole, the electrode the same size, to the thigh, employing a current of five milliamperes for about ten minutes. To increase the circulation, improve the nutrition, and produce active muscular power in the genitals themselves, no better treatment can be instituted than the following: Place the positive pole to the perineum, with an electrode one and one-quarter inch square, and the negative pole continuous to the genito-spinal center of Budge. Or the positive pole, with an electrode sufficiently large, may cover the penis and testicles, and the negative the same position as mentioned before. It is best to commence with a minimum amount of current and gradually increase it to the full endurance of your patient. Both the primary and combined currents should be employed, and both applications should occupy about fifteen minutes.

In some subjects who are particularly nervous and irritable you will notice the effect at the time of the application, while in others you may not notice it for a half-hour or longer after treatment. In those subjects in whom the sensory nerves are not much impaired there will be noticed at the time of the treatment a tingling sensation along the dorsal nerve of the penis, along the inner surface of the thigh, and distributed along the branches of the internal cutaneous nerve, reaching sometimes to the knee. They may have a feeling of warmth or glow in the lumbar, sacral, and gluteal regions. When this occurs the treatment should cease, for if continued it is liable to produce an ejaculation of semen. Some of these sensations may continue for some minutes or hours after the treatment has ceased. The patient may tell you at the next visit what a pleasurable and comfortable sensation he experienced after his last treatment. I have such confidence in this treatment, as being superior to all others, that if it does not effect a cure, I do not believe anything else will.

While we may have the sinuses of the corpora dilated and filled with blood, yet if the muscles do not contract and prevent it from returning, there will be no erection. These muscles, though partially under the control of the will, are usually excited during sexual activity by the reflexes, being equally excited by the stimulation of the sensory nerves of the penis and adjacent parts. In the treatment both galvanism and faradism are effective, and tests of health and of exhaustion of the muscles can be made.

A very effective method is to introduce a suitable electrode into the rectum, attached to the positive pole, and a small flat electrode attached to the negative placed on the perineum. The extra or induced current, with interruptions sufficient to produce forcible contractions, should be used. If this method should fail to produce contractions or improvement in the muscles, then galvanism should be substituted. With the position of the poles the same, we employ a feeble current and slow interruptions, and gradually increase the strength of current and number of interruptions. If we wish to act on the compressor and accelerator muscles we can retain the electrode in the rectum and use an uninsulated metallic sound in the urethra, attached to the negative pole, not using a current strength of more than two milliamperes. The current should be interrupted about twice every second and not used over three minutes. An improvement is noticed by a contraction of the organ to its normal size.

To stimulate these muscles in an indirect manner you place the positive pole to the sacrum and use a bare metallic electrode attached to the negative pole to the upper third and inner side of each thigh, and employ just sufficient current of galvanism to produce a pungent sensation. To do more would still further exhaust the vaso-motor nerves and increase rather than decreased the trouble. The induced current may also be used in the same manner, employing sufficient current to produce forcible contractions. You can also stimulate the muscular branches of the pudic nerve by placing the positive in the same position as above—on the sacrum—and using the negative in the rectum. If the muscles are very feeble, use a current strength of about two milliamperes with a short stabile current, supplemented with twenty to thirty interruptions occupying about a minute.

Associated with defective action of the muscles you will often find a lowered sensibility of the genital cutaneous and special sensory nerves. It is especially noticeable about the prepuce, glans, more particularly around the corona, the papilla, beneath the meatus, and sometimes, if the anæsthesia is profound, in the frænum præputialis. Such cases may possess an excessive cerebral sexual activity with physical failure. There may be a partial erection of the penis, without sexual pleasurable sensation, and a retarded or incomplete orgasm. The electric test is misleading, as the surface sensibility may be quite acute to the current, but tactile sensibility enfeebled or entirely lost.

On account of the associate loss of nutrition, resulting in relaxation of tissue and reduction of temperature, the best method to cover all conditions is to use galvanism. The positive pole is applied to the sacrum, so as to include the pudic nerve from which the dorsal nerve of the penis arises, and a small bare electrode, attached to the negative pole, is placed on the various parts implicated. It is advisable to use a feeble current, just long enough to produce a blush or pungent sensation.

In some cases you will notice an opposite condition,—an oversensitiveness, a hyperæsthesia of the parts,—in which the contact of the clothing will produce an erotic excitement. This is one of the early changes of nerve excitability. It may be produced by preputial, rectal irritation, or other causes. Very frequently this irritation leads to direct stimulation of the genitals by touch, which, if continued, produces an abnormal excitability and a consequent exhaustion of the nerve centers, often a früitful cause of premature emissions. By correcting or removing the local irritation, the central irritability can be successfully treated by galvanism.

For sedation the positive is applied to the sacrum, using a mild current of five milliamperes for about fifteen minutes. The negative pole is applied to some indifferent point, preferably the legs. It is important that the current should be devoid of all changes and interruptions.

For the irritation of the terminal nerves, you envelop the penis in a pliable metallic tube, previously lined with absorbent cotton, to fill up all irregularities in the surface and make more even contact. The positive pole should be attached to the tube surrounding the penis, while the negative pole is placed on the abdomen. A mild steady current passing in the same direction as the normal nerve current of a sensory nerve for ten or fifteen minutes will lower its excitability.

Another frequent cause of impairment of functional activity may result reflexly from continued irritation of the mucous membrane of the urethra and ejaculatory ducts. It is a frequent cause of morbid action of the genital centers and gives rise to various degrees of nerve irritation and sedation. Premature and particularly painful emissions may be traced to congestion and irritation of the veru montanum. This annoying and troublesome affection can be readily removed by introducing a bare metallic sound into the urethra attached to the positive pole, the negative pole being applied to the lumbar region. The strength of current most suitable is one-half to one milliampere, and should be used about five minutes.

To remove the irritation at the ejaculatory ducts you should employ an insulated electrode, having the tip reach to the mouth of the ducts, using the faradic current with long fine-wire coil and rapid interruptions. The current should be just sufficient to be agreeable to the patient and not used over ten minutes.

THE MORTON WAVE CURRENT—SOME DETAILS AS TO APPARATUS AND APPLICATION.

BY LUCY HALL BROWN, M. D., BROOKLYN.

In the December, 1900, issue of the Journal of Electro-Therapeutics there is a very interesting article by Dr. Snow on the technique of the Morton Wave Current.

The object of the present communication is to point out a few conveniences in apparatus and method of applying the current as gained from practical everyday experience.

For general treatment a thin strip of tinfoil one inch in width should lay close to the skin, reaching from the nape of the neck to the end of the trunk. To put this in position without inconveniencing the patient to disrobe I use a flat hard-rubber ruler, such as can be purchased at any of the large supply houses dealing in artists' materials. The one I use is eighteen inches long and two inches wide, and in thickness about one-sixteenth of an inch. I lay the strip of tinfoil on the ruler, bending the end of the foil up on the other side, and then, pulling the collar of the patient's dress or coat back with one finger, slip the ruler straight down as far as desired. The hard-rubber ruler can then be pulled out, leaving the strip of tinfoil in place along the spinal column with the outside end ready to be connected to the conducting cord that shall connect it with the negative pole of the machine. I prefer the negative pole for the patient, grounding the positive pole.

The conducting cords I have made of very large tinsel cord, such as can now be found in almost any large dry-goods store (tinsel trimming being quite fashionable at this moment). The tinsel cord I use is about three and one-half feet long and fully a quarter of an inch in diameter. This I have covered with rubber tubing of a size such as is used with douche bags, but of a better quality—the red tubing carried by dealers in surgical instruments. It has a thinner wall and is lighter in weight and more flexible.

To one end of the cord thus insulated I have attached a spring clip such as men use to hold the ends of their cravats in place, and at the other end a good-sized brass hook. The tinfoil and hooks are carried in stock by the Galvano-Faradic Company of New York. The rubber tubing should be pushed back before attaching the hook and spring clip, so that, when attached, the rubber tubing can be drawn over the connection joints. A piece of heavy sewing silk neatly wound around the tubing at each end will prevent it from slipping and complete the cord.

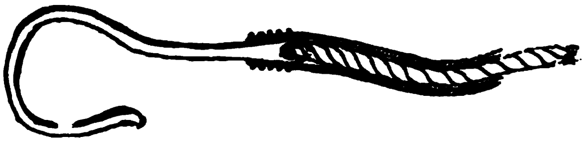


Fig. 1.

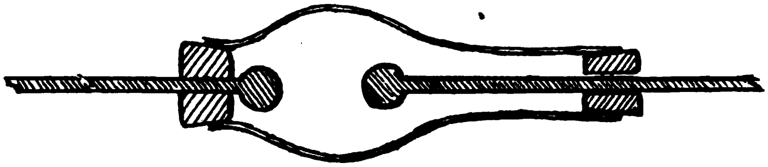


Fig. 2.

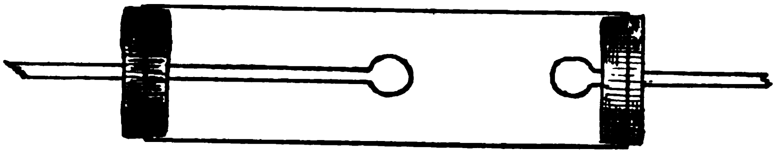


Fig. 3.

The spring clip will grip the end of the tinfoil, and the hook hooked to the negative pole will complete the connection with the machine. The tinfoil should be laid up the neck to where the hair starts and the extra length turned back upon itself.

I seat the patient in a chair having an extra-high back and place a roly-poly cushion at the back of the neck to hold the tinfoil nicely in place at that point.

The back of the neck not being covered by the clothing is generally found to be dry, and it is well to moisten that part with a damp towel to make a more perfect contact with the tinfoil. If this is not done the patient will frequently complain of a stinging sensation at that point when the current is first turned on.

To overcome the loud noise caused by the discharges at the spark gap I inclose the ends of the discharging rods in a large glass tube. The tube I use is three inches in diameter and twelve inches in length. I know of no one who carries them in stock, but a lamp chimney of the largest size answers very well; an argand chimney is too small to be satisfactory.

To attach the glass tube or chimney in place I first unscrew the two brass balls of the discharging rods and slip a cork on each of the rods (one cork should fit the rod tightly, the other loosely), the brass balls are then screwed to the rods again. The corks should be made slightly tapering, so as to hold the glass tube or chimney, by friction, when they are pushed into the open ends of the chimney. The tight-fitting cork should be placed up close to its brass ball.

With this arrangement it will be found that the discharging rods can be moved as though the glass chimney was not there and the noise caused by the spark gap very materially diminished.

It is necessary to remove the chimney occasionally and wash it in warm water to remove the ozone that will accumulate on the inside. Unless this be done the spark will prefer to pass through the film of ozone, instead of taking the direct jump across.

To determine the length of the spark gap it is best to study the comfort of the patient while under treatment. The patient should not appreciably feel the current any more at one point covered by the tinfoil electrode than at another, and the poles of the spark gap should be gently pulled apart until she or he feels the current to be as strong as they can bear it without feeling any discomfort. It is a good plan to place a thin pillow behind the patient's back, so that they can lean well against it and so press the tinfoil in close contact with the body.

After the treatment has been continued a few minutes moisture will form under the strip of tinfoil and the spark gap can be increased. This can be done, if necessary, several times during a treatment, which treatment should last from twenty to thirty minutes.

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THE WAVE CURRENT.

WILLIAM BENHAM SNOW, M. D.

There are so many inquiries from those who are not familiar with the mode of administering the wave current that it seems best to publish the technique again.

1. Place the patient upon the insulated platform.
2. Ground one pole of the machine to a gas or water pipe or other direct metallic ground connection. (This is imperative.)
3. Employ either metal or very wet electrodes—for external application block tin is most suitable.
4. Take care that no article of clothing or other material is beneath the electrode.
5. Connect the patient by conducting cord to the side of the machine not grounded (it matters not which pole is grounded).
6. Close, or nearly close, the discharging rods and start the machine.
7. Gradually separate the discharging rods until the patient complains of feeling discomfort, which will be due to muscular contraction, or pain beneath the electrode if inflammation is present. At intervals the length of the spark gap may, in most cases, be slightly increased.
8. Take care that objects that will draw off the current are not brought near the patient or platform if a long spark-gap is required.

EPITOMES.

THE SUCCESSFUL MANAGEMENT OF CONSTIPATION BY THE MEANS OF THE ELECTRIC CURRENTS.

BY MARVIN A. CUSTIS, M. D., WASHINGTON, D. C.

What disease or condition so thoroughly puts to test the skill of the physician as constipation? Yet it is as common as it is difficult to cure. It can be relieved by various drugs, massage, and, to some extent, by the regulation of the diet, but when a cure is sought failure is the rule, except in some acute cases. Yet, with the judicious application of the electric current inactivity of the bowels can be, in almost every instance, permanently removed.

In order to better understand the treatment, the causes of constipation should be considered.

The various causes of constipation, and they are numerous, may be classed broadly, under four heads, viz.: (a) Where there is a diminution of the sensibility of the nerves. Under this division occurs the cause of the majority of cases of constipation as seen by the general practitioner. This change in the nerve sensibility may be due to constitutional peculiarities, sedentary or irregular habits, the continued abuse of laxative drugs, or, to certain diseases, as anæmia, hysteria, etc. (b) Weakness of the muscles, not only of the bowel, but also of the abdomen. Weakness of the abdominal muscles may arise from frequent pregnancies, obesity, or from disease; while weakness of the muscular structure of the bowel may be due to the presence of tumors or to disease, especially from protracted diarrhea. (c) Diminution or alteration in the secretions of the intestinal tract. This diminished or altered intestinal secretion occurs in various diseases, especially in fevers and diseases having excessive sweating or diuresis. This form of constipation also occurs frequently during the summer months, owing to the sweatings incident to hot weather. (d) Local causes. Tumors, foreign bodies in or pressing upon the intestines, strictures of the intestines, or large masses of scybala may cause constipation by blocking the intestinal canal.

Treatment.—While not denying or trying to belittle the homeopathic remedy in this condition, for a condition it often is, we will, nevertheless, confine our treatment entirely, at the present time, to the employment of the electric currents.

When constipation is due to diminished nerve sensibility or to weakness of the muscles, and this is the cause of nine-tenths of the cases of constipation, I find the primary current of the faradic battery curative. This current may be applied in several ways, but the following mode of use I find most satisfactory:

An ordinary rectal electrode well oiled, attached to the positive pole, is introduced into the rectum, while a small-sized sponge-covered hand electrode, dampened with water and attached to the negative pole, the battery, is applied to the abdominal wall over the right groin. The current used is the primary faradic, with slow interruptions. Care must be exercised that the current be not turned on until the electrodes are in position.

The currents used in the treatment of constipation must be mild, and their mildness must be decided by the patient's feeling, as there are no instruments of precision for measuring the faradic currents.

When everything is in readiness, sufficient current is turned on, and the hand electrode is slowly moved over the abdomen, outlining the course of the colon, i. e., from the right groin, upwards to the ribs; thence from right to left across the abdomen, to the left hypochondriac region, thence downward to the left groin; thence from left to right across abdomen, to starting place. The course outlined above must be gone over from five to ten times at each treatment, always moving the electrode slowly and in the direction given above, never reverse the direction.

Instead of using the rectal electrode as above some electrotherapeutists prefer to apply a large sponge electrode to the anus or perineum, but personally I find the rectal electrode preferable.

Cases of constipation depending upon diminished or altered intestinal secretion should receive treatment for any specific condition present, combined with the electricity. In these cases of constipation I use the galvano-faradic current, applied as above described.

Of course, any local causes giving rise to constipation must be corrected.

I have also obtained good results in constipation from the direct static spark over the abdomen, but this treatment does not, in my hands, at least, equal the application of the faradic or galvano-faradic currents in its curative properties.

Before treatment I always advise the rectum to be cleansed, lest the currents cause a stool during treatment, which mishap is very embarrassing to all concerned.

If patient complains of pains in bowels after treatment, cloths wrung out of hot water may be applied over the abdomen for a few minutes; or, if the pains are in the rectum, apply the cloths over the perineum.

The electricity must be applied every other day for two weeks, then twice a week until the bowels move normally; ordinarily, six weeks' treatment will correct the tendency to constipation. If at any time after the course of treatment as given above the patient's bowels remain inactive for two consecutive days they should receive one or more treatments, or until the bowels again move normally.

The treatment as given above is almost always curative. I will refrain from mentioning cases, but could recite many cases of long-standing constipation, entirely cured by electricity applied as above, after failure of all kinds of medications.—No. Am. Jour.

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ELECTROLYSIS IN TUMORS.

Neftel calls attention first to the fact that the originator of electrolysis and galvanization for treatment of tumors was Gustav Crussel, a Russian practitioner. He made his researches in the 40's, but was overlooked, although he completely and correctly laid down the rational indications for the treatment. He attributes the immunity from complications that follow this method largely to the escape of gases developed in the living tissue, especially ozone, peroxide of hydrogen, chlorin, which fact renders the electrolysis process the most efficient antiseptic; the part also played by the acids is mentioned. He considers it an ideal antiseptic, since it can reach the most hidden places and cavities inaccessible to other antiseptics. The article goes into detail as to the chemical and physical action of electricity, the effects of the current on the tissues, the action of the two electrodes, etc. He considers the treatment of benign and malignant tumors to be based on entirely different principles. In the latter our aim is to produce in one operation by the action of the anode the necrotic destruction of the tumor and all the infectious germs of the surrounding tissues. This must be accomplished in the early stage, while the disease is yet local and the lymphatic glands are not infected and deposits lacking in distant organs. The effect of such an electrolytic operation is the relief of all the morbid symptoms and complete recovery. The treatment of benign tumors is based on a different principle, that of inducing by the action of the cathode regressive metamorphosis, molecular disintegration, absorption, and atrophy. The remainder of this paper is taken up with a description of cases.—Med. Record.

THE ELECTRICAL TREATMENT OF UTERINE FIBROIDS.

BY DR. GIDEON C. SEGUR.

Electricity properly applied may be considered a specific for uterine fibroids. A moderate dosage, from 40 to 50 milliamperes, applied for twenty or thirty minutes, relieves pain and induces a diminution in size. There are no dangers to be feared from its use, if carefully conducted. Puncture is not necessary in order to obtain practical results. No serious operation should be undertaken until after electricity has been tried.—Phila. Med. Jour.

COMBINED ELECTRIZATION.

Rockwell finds the combined method of using the galvanic and the faradic current together as especially beneficial in many disorders. Its musculo-sedative effect is more marked than that of other electric methods, and, therefore, it is valuable in local spasms. He has also found it beneficial as a stimulant over other methods of electric application in diaphragmatic paralysis and to more rapidly ameliorate the symptoms of Graves' disease.—N. Y. Med. Jour.

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X-RAY INJURY.

A case of severe X-ray injury is reported by Dr. Cassidy. The patient was male, aged forty, and was exposed for forty-five minutes, five inches from the tube, which was of medium vacuum.

The current was generated by a static machine, the plates revolving 212 times to the minute. During the exposure there was not the slightest pain. A week later the surface began to itch and an acute dermatitis developed, which, at the end of the second week, involved the lower third of both sides of the abdomen and upper third of both thighs.

The inflammation went on to the formation of vesicles, then bullæ, and at the end of the third week the epidermis came away.

Under treatment the right side healed, and all of the left except a space the size of the hand in the groin, which was covered with a tough yellowish membrane.

After trying various things the diseased tissue was removed with the knife; and later skin-grafting, under which the patient made a good recovery.

The interesting points were: The fact that the patient during the time of exposure, although perfectly conscious, suffered no injury or pain. Eight days elapsed before the appearance of any injury, and then only a slight dermatitis. The rapidity of the changes in the tissue involved a truly mummified condition in which the lesion appeared dead, yet had sufficient vitality to be indestructible. To the touch the induration was hard and unyielding and not at all sensitive, but at certain points it would bleed on friction, the severe paroxysms of excruciating pain, upon the application of any poultice or wet dressing, showing the induration to be highly absorbent. The marked constitutional symptoms and rapid wasting without much rise of temperature.

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ELECTROLYSIS IN THE TREATMENT OF STRICTURE OF THE LACHRYMAL PASSAGES.

BY L. L. MIAL, M. D., NEW YORK.

Assistant Surgeon, Manhattan Eye and Ear Hospital.

The subject of electrolysis for obstruction of the lachrymal passages is one which is most wholly ignored in treatises on ophthalmology and medical electrology, despite the fact that it has been employed and recommended by a number of competent and conscientious practitioners for nearly a generation. As electrolysis of the lachrymal passages is, in my opinion, a promising resource in ophthalmology when properly managed, I submit my own personal experience in this field. The operation was suggested to me while I was at work upon the subject of electrolytic dilatation of the eustachian tube as practiced by Dr. Arthur B. Duel. At this period I had under my care six old cases of stricture of the lachrymal duct, in all of which the regular Bowman method had been employed, probing having been done at regular intervals over a period of from three months to two years. Each of these patients exhibited a mucopurulent discharge which rapidly ceased, especially as to purulency, after two or three applications of the electric current through a Bowman probe, at intervals of a week. These patients were all instructed to report in case of return of symptoms; but, although I began to use this method ten months ago, not one of this number has reported unfavorably.

I was sufficiently encouraged by these results to have constructed for me a special set of lachrymal electrodes, adapted to the treatment of cases which had never been submitted to any sort of surgical intervention. I hope to publish at no distant date a more compendious paper on this subject, which I shall illustrate by all necessary cuts of instruments, etc. At present it appears to me that the knife, in simple stricture of the lachrymal ducts, is unnecessary, and should be wholly replaced by the electrolytic bougie. With the fine probe-pointed conical electrode, it is in almost every instance possible to enter the punctum and dilate the canaliculus sufficiently to pass a No. 5 electrode for electrolysis of the nasal duct. In one instance only, out of six cases, have I been compelled to slightly incise the punctum, as ordinarily done in Bowman's operation. In cases of simple epiphora, without any muco-purulent discharge or dilatation of the sac, this method of treatment appears to be an absolute specific.

I do not, of course, contend that this method is a panacea for lachrymal stricture. There have been a few cases of hospital patients, which are unusually severe, and which have been under long and various treatments, in which the results have not been so satisfactory; but all these patients have been, on their own voluntary statements, very much benefited.

The chief indication in lachrymal obstruction is to get the passages open and then keep them open. Electrolysis does this speedily, painlessly, and without hemorrhage, and, furthermore, is antiseptic in its action. The strength of the current should not, in my opinion, exceed three milliamperes. The positive pole is a flat sponge electrode, which may be applied to the back of the neck, and may be held there by the patient's hand or by a clamp. I prefer to have the positive pole at the neck, instead of the hand, on account of the greater voltage demanded by the latter locality, with the resulting formation of counter-currents. Two minutes is long enough under all circumstances for the current to pass. Short and frequent sittings are preferable to longer (five-minute) sittings a week apart. Even two-minute treatments have sometimes caused considerable hyperæmia, with itching and pain, lasting for twenty-four and thirty-six hours. After withdrawing the probe, it is well to wash out the canal with a four-per-cent. solution of protargol.

The apparatus used consists of a volt-selector, a current-controller (rheostat), and a milliamperemeter, attached to the Edison current, five lachrymal electrodes, the conical dilator, tapering from No. 1 to No. 8, No. 5, No. 8, No. 10, and No. 12, all insulated to within half an inch from the top.

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STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

BY WILLIAM BENHAM SNOW, M. D.,

Late Instructor in Electro-Therapeutics and Nervous Diseases in the New York Post-Graduate Medical School and Hospital.

CHAPTER III.

CARE OF THE MACHINE AND MANAGEMENT DURING PERIODS OF HUMIDITY.

Location of the Machine.—A damp house, either on account of improper construction, as is the case with many of the older brick houses, or from location with reference to the exclusion of sunlight, will cause no little trouble, and eventually ruin a static machine, if the most constant care is not exercised. It is of first importance, then, that a machine be placed in a properly constructed and well-located house. A room on the sunny side of the house, if convenient, will add another marked advantage in caring for the machine.

It must be borne in mind that, regardless of what manufacturers say, during periods of humidity moisture will get into the case, and, furthermore, if it should not, the air as it becomes more and more saturated with moisture, will finally conduct away the electricity as rapidly as it is excited, and the patient get little or none. This is due to conditions not met with in other electric currents, and therefore little appreciated by those unfamiliar with the use of static electricity. The conditions arising during periods of humidity are: (1) The moisture gradually creeps into the machine and interferes seriously with the excitation of the electric currents. (2) If conditions within the case permit the excitation of the currents, the air, no longer acting as a dielectric, spirits away the electricity of very great potential and infinitesimal amperage. (3) The consequence is the patient is not treated or the Crookes tube excited. The first difficulty may be obviated or remedied in several ways, and deserves attention because the maximum current excited insures the delivery of the largest possible amount to the patient.

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To remedy some of this difficulty there are various methods.

(1) Some prefer to keep no chemicals within the case for the purpose of absorbing the moisture as it may accumulate, but use means to get rid of it when necessary. An easy method is to fill a large fruit jar with well-mixed, finely cracked ice and salt, in about equal parts, and having wiped the surface dry, quickly place it upon a plate within the case, and promptly close. The moisture within the case rapidly condenses upon the surface of the jar, and in less time than by any other method the moisture is condensed, the air dried, and the machine will charge. This procedure may be repeated from time to time, and no other means be employed except ventilating it on dry days.

(2) Many of the most successful operators place vessels containing dry calcium chloride within the case, allowing it to remain, and remove it only when it becomes wet for purpose of drying (which may be done in an oven or over an oil or gas stove) or replacing it by fresh. Others only make use of an absorbent during the summer months.

(3) Quicklime is preferred by many, but should be used in greater bulk and in vessels carefully covered with gauze to prevent the fine dust from flying about the machine. To the

writer this seems the least objectionable of absorbents, and need only be employed during the months when humidity interferes. Use from ten to twenty pounds, changing about once monthly, when the machine should be opened top and ends and thoroughly aired out to get rid of the accumulated ozone, which will attack the hard-rubber and metal parts of the machine. Choose a dry day for changing the lime and airing the machine, and no interruptions will arise.

(4) It has been suggested that the machine may be dried out by placing a small electric heater within the case and closing it. When we reflect that heat does not consume, but rather increases the capacity of the air to hold moisture, what can be gained, unless an exit is provided for the escape of the heated air, and a source created for dry air which may flow in to take its place? For the present we believe electric stoves will be little used in this connection.

(5) A provision that precludes the necessity of any of the above measures, except removing the ozone from the case, is to keep the temperature of the operating room at 60° to 70° F. during periods of humidity, when the machine will always do good work, and the air remain so dry as not to interfere with the administrations to the patient. This is accomplished as in refrigerators employing condensed CO_2. The gas is passed through a series of condensing pipes communicating with a cylinder of liquid CO_2. A device provided with a thermostatic rod may be so adjusted as to automatically maintain any desired temperature. With such a provision the moisture within the room is condensed upon the pipes and the room is cooled. Wherever any plan is introduced that will maintain the above temperature of the operating rooms, it will be possible to obtain the best results at all times and seasons. There are but few localities where the necessities for such measures will arise except for a few days during the heated season. In the sanitaria and hospitals of the country the need will be most felt, when, as time goes on, the real value of static electricity becomes appreciated and its adoption is universal.

Before finishing this chapter it is well to consider what to do if the machine has become useless from accumulation of moisture on the revolving and stationary plates. If the manufacturer is in the town, call upon him. If not, do not despair, for common sense and a little patience will succeed in making it work as well as a new one. The machine is simply to be dried out. For this purpose there is no better agency than the direct rays of the sun. Remove the top and ends of the machine and place it where the sun can shine upon it for several hours, and nothing more may be required. Or a yardstick about one end of which is wound a piece of dry chamois, will remove much of the moisture, if the parts are carefully wiped out. After this it would be well if the machine could stand for a short time in the direct sunlight. If, however, it is not convenient, employ one of the other measures for drying it out.

The metal parts—the prime conductors, discharging rods, and small balls—should be kept well polished and free from dust, to prevent the escape of electricity from the multitude of small points which thus accumulate.

Carefully note from day to day the condition of the interior of the machine, and adjust the plates or combs whenever friction of the parts is discovered. The chafing of the revolving plates against the stationary ones, if not otherwise discovered, will be indicated by white spots near the circumference of the revolving plates. It may often be necessary to remove the top of the case to locate and correct the trouble. No special mechanical skill is required to make such adjustments. The greatest annoyance when the case is first opened, however, will be occasioned by the irritating ozone which accumulates within. If the weather conditions are favorable, it is always best to let the ozone escape before correcting the trouble, otherwise take care not to inhale the gas, for though not dangerous it will induce paroxysms of coughing and discomfort which may last for hours. Whatever the character of the bearings, keep them well oiled. This injunction should not be necessary, but it is often neglected and easily avoidable damage done to the only part of the machine subjected to friction and liable to wear. With proper care, a well-constructed static machine will endure for as long a period of time as any physician will want to use it, and always operate satisfactorily.

A METHOD FOR OBTAINING MORE SHARPLY DEFINED PICTURES OF THE THORACIC CONTENTS DURING RESPIRATION.*

BY W. Y. COWL, M. D., BERLIN.

Indicative of a marked defect in our otherwise probably most exact method of physical examination is the fact that one can decide almost by a glance at a skiagraph of the thorax obtained in the usual manner, whether the picture was obtained during life or after the death of the individual.

In the latter, sharp markings are noted, in the former the borders are ill-defined. The indistinctness of the outlines are particularly noticeable at the extremities of the ribs, at the diaphragm, and at the heart, and can, without hesitation, be referred to the respiratory and cardiac movements.

Impaired to a less degree than the picture of the normal thorax is, naturally, the reproduction of adherent, indurated or inflamed parts; but also in such cases, the movements of the lungs, are, as a whole, undiminished in extent, the normal breathing capacity during rest, as determined by Vierordt, Katzenstein, and others at 300-500 ccm. or 5-7 liter per minute, being also scarcely diminished even in persons suffering from pulmonary disease. Fever is the only exception, which, according to the experiments of V. Leyden, Fränkel, and Senator, shows a marked increase in the exchange of gases.

In view of the functions of the organs of the thorax, and in order to place the Roentgen examination on equal footing with other graphic methods, it seems particularly important to have a complete removal of the aforementioned defects.

Having previously been able to demonstrate the Roentgen picture of an excised lung, showing the outlines of the bronchial tree with its finer branches, and correctly exposed thorax pictures also exhibiting the shadows of the larger bronchial and pulmonary vessels,* the desire ought not to be unjustified to exactly demonstrate the structural integrity and changes of position of the thoracic contents in every given case, especially as the path thereto has already been shown by Levy-Dorn, who succeeded in obtaining on one occasion, by means of faultless reinforcement of the screen during long continued inspiration, a set of pictures with all the details of the thorax of healthy, and recently also of sick persons;† in addition to this, Guilleminot has attempted to secure pictures of the thorax automatically, both during expiration as well as inspiration, particularly to demonstrate a displacement of the right border of the heart noticed by Bouchard on the screen in certain cases of disease. The former announced at a session of the Paris Academy that he had succeeded by means of a specially constructed apparatus used in four cases, to demonstrate thus far, that aside from a change in position of the diaphragm, an appreciable displacement of the border of the right auricle had also been proven.‡

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* "Fortschritte auf dem Gebiete der Röntgenstrahlen." Translated from the German, by Dr. W. H. Dieffenbach, New York.

As regards the former method, same will always be first applied as soon as means are found to also secure fully exposed pictures when a long interruption of breathing is not readily possible. This period has, however, not been reached by far. But even under these circumstances, well-defined pictures of the thorax taken during expiration will, on account of lack of air, be obtainable only under most favorable conditions.

Furthermore, it is also to be considered that with increasing dyspnœa, the heart, being overloaded, constantly changes its shape.

Taking these things into consideration, it would seem best for the present to attempt to secure a reproduction of the thoracic contents primarily in such a manner that invariably, at certain phases of the respiratory movements, the play of the Roentgen ray is permitted to fall rhythmically on object and plate. An attempt on these lines was made by Stechow some time ago, in which he, first during the inspiratory, then during the expiratory position, alternately interposed and withdrew a metal cover between the Roentgen tube and the person he was experimenting on. This procedure, as well as that of Guilleminot appears not to have been applied again, nor were they recommended for further use.*

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* "Berliner klin. Wochenschrift," 1896, No. 30; "Zeitschrift f. diätetische u. physk-Therapie," 1898, II. 1.

† "Deutsche med. Wochenschrift," 1899, No. 10 und 12.

‡ "Compt. rend. d. l'Acad. d. sciences," t., cxxviii. p. 340, 8 août, 1893.

With a shutter it is surely not easy to always permit entrance of the rays precisely during the same phase of respiratory action. With the automatic procedure, on the other hand, there may possibly have been imperfections in the apparatus, which has not been completely described † or defects may have occurred in the procedure itself, thus preventing its adoption as a general method for the production of thorax pictures. It is also not at all easy to mechanically utilize the vibrations of a body of even circumference, if not of volume, for the application of an exactly working electrical contact. From a firm base, in this case the spinal column, the measuring tape must glide along the surface in a progressive manner. This can be accomplished when the surface is firm and smooth; it is difficult or cannot at all be done on a skin which does not possess such properties, and, which, under increased pressure, instead of permitting the gliding along, is depressed, as anyone who has once essayed measuring the expansion of the thorax is well aware. The gliding along of the skin on its subtratum, which, under the immediate control of the eye, barely permits such measurements in practice, can hardly be used with an apparatus which must operate for some time, as the strap or belt is not only pressed in with every movement of respiration, but is also gradually and constantly being pressed deeper into the tissues, and consequently in twofold manner changes the action and the time of contact.

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* "Verh. d. Chirurgen-Kongresses," 1897.

† Regarding the construction and action of the apparatus, the following is noted: first a belt of leather, the ends of which are covered with wood and connected with rubber bands; on one end is a hook to which is fastened a string, on the other is a pivot with lever, which the string pulls rhythmically during respiration. The lever causes closure and opening of a circuit of a battery fed with three cells, which supplies an electro-magnet for the insertion and withdrawal of an interrupter of the spark inductor. Across the anchor of the electric magnet, supplied with a hinge, rests a cross-piece, whose two ends respectively carry a wire stirrup which, through motion of the beam, dips in and out of a receptacle containing mercury attached in the primary current, and in this manner causes closure and opening of the main circuit. By means of interruption of the current either one or the other of these stirrups may be utilized for the production of the necessary power, so that the Roentgen rays are only produced during the inspiratory or expiratory position of the thorax.

In pursuit of the desired end, I, at first, without considering the necessary mechanism, made observations of the respiratory movements in the region of the back, as no data were found in literature in reference to same.*

By means of measurements on a healthy male adult who possessed marked costal, as well as the usual more well-defined abdominal breathing, I found, in the lower thorax with quiet respiration, a variation in circumference, measured by means of a tape with even and mild tension, of averaging less than 1 cm. (2-5 inch); on the other hand, at the sagittal arches of the abdominal wall an even result was found, which, at several measurements, proved far more uniform than the measurements of the thoracic expansion, no matter whether the lever used for measuring was pressed lightly or firmly against the skin.

It was, therefore, quite evident that the respiratory movements of the abdomen would furnish a suitable agency, especially as the apparatus which was to be applied would be located remote from the limits of the portion of the body to be skiagraphed. Furthermore, I could determine that at one and the same respiratory volume the variations of the lower thoracic cavity were in circumference, as well as in diameter, greater during sitting or standing than when lying down, and reversely, that, as was to be expected, the opposite was noted of the abdomen, which, during inspiration, expands far more when in a horizontal than in an erect position of the body, no doubt due to the broad and firm fixing of the thorax in the latter position, which markedly checks the movements of the ribs.

A temporary model which I thereupon constructed showed the actual practicability of uniform measurements of the respiratory movements at the abdomen at the closure and opening of an electrical circuit, as well as the possibility of a delicate and convenient insertion of a definite contrivance during respiration of greater or lesser volume. The local firm of W. A. Hirschmann thereupon constructed such an apparatus in suitable manner, which was utilized in further experiments. With the auxiliary appliances the apparatus consists of three parts. (See cut.)

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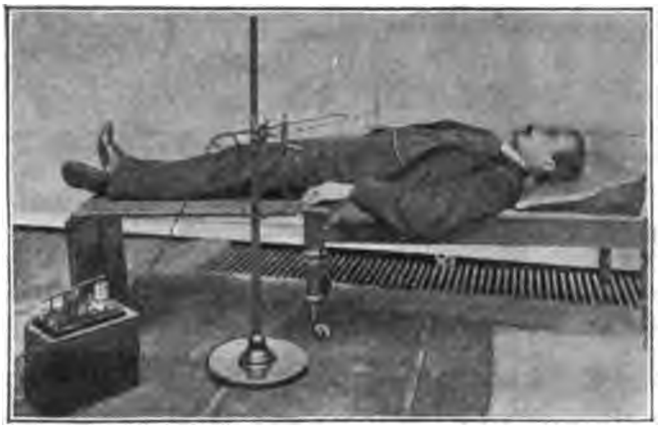
* The circumference of the thorax seems always to have been taken in the erect position, in even lines, at other times usually only in the dorsal position. See Vierordt "Daten u. Tabellen," Jena, 1888.

1. An easily movable, double-armed lever, which may be termed a "rheotom," which receives, through a large "pelotte" attached to one end, the movements of the part of the body utilized. By means of a platinum contact, at its other extremity, the Roentgen rays are electrically set free at either stage of respiration.



2. A small electro-magnetic interrupter which, influenced by weak current and "the rheotom," opens and closes the way for the primary current to the inductor, and the usual interrupter in a purely mechanical manner.

3. An accumulator which is placed in the circuit with the "rheotom" and the small interrupter, and like the latter is placed near the inductor, and by means of a double wire is electrically connected with the "rheotom."

To obtain a given skiagraph at inspiration or expiration, the platinum plate at the contact is placed in a convertible manner against the end of the lever supplied with two platinum points, so that closure of the currents may be had by the movement of the lever upward or downward. By means of a controlling screw, at the extremity of which is the plate, the closure of the current is deferred to the desired stage of respiration, which latter is not at all impaired by the action of the mechanism.

In order to apply the " rheotom " at the proper location of the body, same is arranged convertible to a horizontal or vertical position; the former by means of the arm carrying the lever, the latter by fastening the whole at a suitable height, preferably to a heavy stand or tripod on the floor, which serves as carrier for the Roentgen tube.*

In the use of the " rheotom " three indications are synchronous, giving note of the recurring beginning of the production of the rays; *i. e.*, first, the fluorescence of the Roentgen tube; second, the noise of the spark of the actively engaged large interrupter at the inductor, and thirdly, the stroke of the anchor at the small interrupter on the core of the electro-magnet. This third sign alone (at the withdrawal of the inductor), even before taking the picture, and in a convenient manner, permits of the proper interposition of the " rheotom " during respiration of the individual, who is quietly resting on a bromo-silver gelatine plate.

After the injunction to cease breathing for a short time after each sound of the stroke of the anchor has been regularly obeyed, the main current is inserted, during which the rhythmical action of the Roentgen tube and the sound of the spark give further note to the individual, who will almost unconsciously be guided by it. With this, the whole proceeding is left to run an automatic course during the time of the taking of the picture.

In the manner indicated, the two pictures reproduced on Plate XVII. were secured from the before-mentioned individual; the latter was forty years old, more muscular than fat, weighed 65 kilograms (145 pounds), measured 1666 cm. (5 feet 6½ inches), in height 90 cm. from the vertex to the tuber ischii, and the circumference of the chest over the mammary glands (*i. e.*, also over the scapulæ) was 78-85 cm. over the ensiform cartilage 75-84 cm.

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* The " Rheotom," as well as interrupter, accumulator, and stand, may be had at W. A. Hirschmann's, Berlin, 14 N. Johannistrasse.

The main radiating point of the Roentgen tube was located 75 cm. from the plate and 55 cm. 22-inch—being inserted there by means of a plumb, vertically above the ensiform cartilage, on which was placed a five pfennig-piece.*

In order to demonstrate the marked difference of the inspiratory and expiratory positions of the thorax, respiration was vigorously maintained, but without discomfort, during a rigid test of the procedure, with an unusually long exposure of ten and fiftenn minutes (gross), depending on whether respectively the single-coated (Schleussner) or the double-coated (Anilin-Gessellschaft) bromo-silver gelatin plate was employed.

The net exposure amounted to about one-half of the given time.

The length of the spark of the utilized induction strokes was 30 cm. (12 inches). The primary current strength did not average over 2-5 ampere. The closure and opening times were about the same, the frequency amounting to about 25 per second.

The negatives were developed with glycerine-potash in from 1-3 hours in the Albers-Schoenberg celluloid receptacles,† by means of which all the details of the picture appeared in satisfactory manner, especially as regards the shadows of the vertebræ, with the coin in the light portions and the bronchial vessels in the dark portions.

* The other shadows of metal articles—buttons, etc.—belong to the clothes, which were not taken off, in order not to abnormally change the size of the heart by the cooling of the surface of the thorax, even though the room was heated.

† The essentially correct principle on which this method of securing the Roentgen pictures is based, which in contradistinction to regular pictures are exposed throughout the whole layer as mentioned by me at the time (deutsche medic. Wochenschrift, 1897, No. 17) with the proof that by means of a bromo silver layer, pictures may be obtained in less time and with more dis tinctness, was herewith corroborated. I used this opportunity to determine that the sensitiveness and other qualities of a two-fold, double (one over the other) or doubly coated bromo-silver gelatin plate (such as were heretofore used only of the latter variety) must approximately be of as good a quality as the singly coated plates in order to be much superior to the latter.

Both pictures were reproduced by means of diapositives, which were secured directly from the original negatives by means of photography, a method by means of which the minutiæ in the picture of glass-plates coated on both sides are no longer reproduced in an indistinct manner.

The outlines of the picture in Fig. 1, which was obtained from such a plate, are very distinct, even more so than those of the second, secured from the singly-coated plate. The slight lack of distinctness of the latter is, however, solely to be referred to a diminished supply of the ray.

The resulting pictures are very satisfactory, especially as compared with those of the usual skiagraph of the normal thorax which, at all points affected by the respiratory movements, show a more or less broad, cloudy border which partly or completely covers important details. They excel somewhat less in comparison with the pictures of certain diseased conditions such as aneurisms, spondylitis, pleuritic adhesions, etc., where the affected organs are fixed or hampered in their movements. In this connection I would assert that the presence of sharp outlines of the heart and diaphragm on the usual skiagraph suggests the presence of a condition deviating from the normal, while a determination of the impairment of the movements of the organs, eventually also the closer significance of the same, can probably only be obtained by means of the double pictures with utilization of the above described procedure.

The outlines of the different parts of the reproduced skiagraphs appear, when closely inspected, to have reached the stage of reproduction when the small, not transmissible portions of tissue offer so small a resistance to the rays of light as to offer no contrast with their surroundings in the picture.

Among the details to first attract attention in the expiratory as well as the inspiratory picture is the great distinctness of the summit of the diaphragm and of the ribs, especially the anterior extremity of the latter, also the sharp borders of the aorta and of the heart, besides the less distinct outlines of the left ventricle, rendered so on account of its independent movements.

The outlines of the arch of the aorta to the left of the central shadow leave nothing to be desired as regards distinctness. The two auricles are, especially in the inspiratory picture, sharply distinguishable from the lungs, the left auricle in both pictures also being strikingly enlarged, apparently being attached above to the Bulbus aortæ. The shadow of the descending aorta is partly covered by the transverse processes of the dorsal vertebræ, which from the third downward are located progressively lower beneath the respective ribs.*

The heart and aorta, as a whole, appear enlarged in the pictures. The apex-beat was also found external to mammary line in the fifth interspace. This enlargement did not, however, prevent the bulk of the heart, which descended in a perceptible manner with the diaphragm, from nevertheless lagging somewhat behind, as the left arch of the diaphragm, which is just about appearing in the expiratory picture, is clearly marked by a lighter area in the skiagraph of the inspiratory picture, as is frequently seen on the screen in healthy persons.

As an explanation of the lighter area, it is evidently not improper to assume that the right ventricle located at the diaphragm, as well as the apex, is markedly distinct from the reflection of the pericardium attached to the midriff, as otherwise the aforesaid light area of the former would appear almost like that of the lungs.

The points involved are simply the separation of the diaphragm from the posterior part of the heart (the left auricle and the adjoining portion of the left ventricle), the parietal layer of the pericardium, which at this location is but loosely attached to the diaphragm.†

It is the base of the heart which can least respond to the movements of respiration, while nothing prevents the descent of the apex which has but to slightly turn from its usual position pointing to the left, as evidently happened in our case.

In regard to the reproduction of the external border of the left ventricle, "rheotom-pictures" of entirely normal and younger individuals showed varying distinctness in outline, which, however, in certain cases was strikingly enlarged. Judging from this as well as the mentioned results of the "rheotom procedure," it is highly probable that the indistinct borders of the heart in the usual skiagraph are mainly due to the movements of respiration, rather than to its independent movement. These facts, however, render possible the positive determination of the extent of the movements of the heart in a transverse direction.

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* Vgl. "Luschka. Die Brustorgane des Menschen," Tafel V., Tübingen, 1857: Derselbe, die Anatomie der Brust, Fig. III., page 57, Tübingen, 1863.

† See *op. cit.*, Plate IV. or Fig. III., page 57, and Fig. IV., p. 71.

In connection with the just described reproduction, the respective relations of the normal thoracic contents will be treated more fully, with typical Roentgen pictures, in the special part of "the Atlas of Normal and Pathological Anatomy" announced by the publishers of this journal.

In the discussed pictures the branches of the pulmonary vessels are shown all over, excepting at the upper and lateral parts of the thorax. The coronary vessels are also pictured, their shadows with the musculi papillares looking like the markings of marble.*

The ramifications show a course as described in the anatomy, thus readily permitting differentiation from pathological thickening. The unmistakable reproduction of a spot, showing the branching of the vessels near the arch of the aorta, makes it possible to measure the displacement of this part of the lung during respiration. In the expiratory picture it is shown at the level of the fourth dorsal vertebra; during inspiration on the other hand, it is fully one intercostal space lower. The adjoining arch of the aorta shows a movement of about one-half of this distance.

The "rheotom" procedure is also recommended for skiagraphs of the abdomen, especially when it is essential to determine the presence of foreign bodies in organs affected by the respiratory act. That these may also travel as far as the pelvis is well known, but their importance is probably underestimated. In the execution of such pictures the "rheotom" is applied at an unimportant part of the abdominal or thoracic wall.

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* On account of the diminished diaphaneity of muscular tissue as compared with the blood; vgl. "Berliner klinische Wochenschrift," 1896, No. 30.

GALVANISM IN NASAL HYPERTROPHY.

BY JOHN B. GARRISON, M. D., NEW YORK.

Presented at the Annual Meeting of the National Society of Electro-Therapeutists, at Atlantic City, N. J., September, 1900.

Hypertrophic rhinitis is one of the most frequent of the diseased conditions pertaining to the nasal cavities that we are called upon to treat; and the question of the most suitable mode of treatment is one to be decided with care. We have all used, perhaps, with more or less success, for the removal of the excess of tissue, the acids, the actual cautery, or some form of cutting instrument; but the patient, at least, will welcome any method that promises a good result with the least amount of pain at the time of treatment, and the least soreness afterward. I have found that treatment by the galvanic current does, in many cases, furnish just the method desired, and I shall ask your forbearance for a few minutes while I speak of the method I have pursued in my practice in making the application.

I shall not burden you with what I consider to be the cause, or causes, of hypertrophies in this region, for a perusal of the text-books will enable you to gain all the knowledge obtainable upon the subject. We do find an increase of the nutritive forces, and we must, in some way, decrease the blood supply. Of course where there is an irritation acting locally, it must be removed.

If it is a deflected septum which causes contact with the opposite side, suitable means must be adopted for repair before attempting to treat the hypertrophies opposing the irregularities of the septum.

The hypertrophies that I shall speak of as being most amenable to treatment by means of the aid suggested in my title, are mainly those of the turbinated bodies; and of these, the inferior is the one most often enlarged. It may be confined to either extremity, or the whole body may be the subject of hypertrophy. When, as is sometimes the case, the bony portion of the turbinated has become enlarged, the saw, and not electricity, will be the best means of cure. But when the occlusion of the nares is caused by true increase of tissue, we have, in galvanic electricity, a potent agent to safely and rapidly remove the obstruction.

To prepare a case for treatment, I always first thoroughly irrigate the nasal cavities with some antiseptic fluid, using the post-nasal syringe. The solution that I most frequently use is electrozone one part, and tepid water four parts. Then an application of a four per cent. solution of cocaine is applied to the location to be treated, simply to prevent the little pain which accompanies the introduction of the electrode. The electrode I use is a slender needle, of suitable length for easy use on the part selected, and I insulate it by dipping it in shellac and laying it away until it is perfectly dry, then scraping away the insulation as far from the point as it is calculated will be impaled into the tissues.

This is fastened into an ordinary needle-holder and connected with the negative pole of the battery, when it is introduced into the tissue at the point selected. The patient then is given the sponge electrode connected with the positive pole of the battery, and is told to grasp it firmly. The current is then slowly turned on until the meter registers from three to five ma., which is allowed to remain stationary for about five minutes, unless the patient is very nervous, when three minutes should be the limit. The current is now turned off as gradually as it was turned on, and the needle carefully removed. I do not attempt a second treatment at the same point until a week has expired; and in some cases two weeks can be permitted to go by before the shrinkage due to the electrolysis has subsided. The stronger currents have been tried, but the strength I have given acts more pleasantly and gives as good results.

During the summer just passed I had an opportunity of noticing the reduction of an enormously hypertrophied inferior turbinate in a most unexpected manner, which I am glad to be able to relate to you.

A lady of about fifty years of age, who was stopping at the hotel at which my family and myself were located, came to me one day to ask my opinion as to her eye and nose. She had

had a stricture of the nasal duct for a number of years, which had been duly dilated several times, and for a considerable time she had had a dacryocystitis, which annoyed her greatly. The inferior turbinated on the affected side was hypertrophied for nearly its whole length, and was in contact with the septum for some distance anterior, being of a deep-red color and very sensitive. I told her that I believed it would be necessary to remove the turbinate with a saw, and advised its being done as soon as possible, giving it as my opinion that it would be necessary to do this operation before the eye condition could be helped. The patient admitted that it might be necessary to do as I advised, but was inclined to wait a little until she could get her courage up. Meanwhile she wanted the canal dilated, and begged me to do it. Upon a visit to New York I supplied myself with a canaliculus syringe and a set of Bowman's probes, and on my return announced myself as ready to treat the case. I proceeded to insulate the probes in the manner alluded to in the case of the needles for intra-nasal work, scraping the points bright for about one-quarter of an inch.

Before introducing the probe I washed the sac out thoroughly with a fifty per cent. solution of enzymol, and then, connecting the probe electrode with the negative cord of a galvanic battery by means of an artery forceps, introduced it (No. 2—a No 1 would not pass with considerable pressure) into the canal and turned on the current until the meter registered 2 ma. Using just enough pressure to guide the electrode it gradually found its way along the canal, and in less than five minutes it had entered the nasal cavity without causing a drop of blood to be lost. In three days I passed a No. 4 in the same manner, and four days later a No. 6 was passed easily. Three days after this a No. 7 was passed, and this size was passed three or four times afterward at intervals of three or four days. After the first passage of the last size all of the solution used for the purpose of cleansing the sac, passed through into the nasal cavity directly from the syringe, and there was no further collection of pus in the sac, although a week was permitted to elapse without treatment. But the point that I wanted to bring out was that after the second treatment of the canal, the color of the mucous membrane covering the turbinate began to pale, and at the end of the treatments the entire body had contracted sufficiently to permit full and free drainage and respiration.

I am led, by this, to the thought that it may be good treatment in many cases of hypertrophy of the inferior turbinate, and possibly the others as well, to use the insulated probe electrodes in the lachrymal canal with the weak current, not exceeding 1 or 2 ma.

A careful use of this means of treatment may prove that we have a valuable and comfortable way of curing a class of cases that have given much trouble to both patient and doctor.

THE CAUSE OF SOME CASES OF NEURASTHENIA, AND THEIR TREATMENT BY ELECTRICITY.*

BY FRANCIS B. BISHOP, M. D., WASHINGTON, D. C.

The conglomerate set of nervous symptoms known as neurasthenia, or nerve weakness, frequently seen in the individual predisposed by an unstable nervous system, may be caused by a variety of morbid conditions, reacting upon the nerve centers, thereby producing pathological and often degenerate changes in the cells themselves. These changes, according to the centers involved, will give expression to the mental and physical symptoms known as neurasthenia and sometimes epilepsy, hysteria, or perhaps severe neuralgia. Any slight physical derangement, such as severe nervous shock, a uterine disorder, a urethral stricture, or a sensitive prostate, is all that is necessary to fan the slumbering flame.

As has been frequently pointed out by writers upon this subject, neurasthenics are not the physically weak individuals, as a rule, but many of them seem strong and vigorous, and are usually men and women of the better class—society women and brain-working men; and it is to this class of patients of sedentary habits that I wish particularly to refer to-day; while my investigations may have revealed nothing absolutely new, they have revealed some facts, and facts are always worth recording.

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* Read before the American Electro-Therapeutic Association.

For the past three years it has been my custom, in all cases of neurasthenia coming under my care, to have a quantitative analysis of the urine before beginning my treatment; and in nearly every case I have found the amount of certain solids markedly diminished—especially is this the case in the elimination of urea. The specific gravity is often within the normal limit. The amount of urine passed in twenty-four hours is often below the normal, while the earthy phosphates are always in excess. Thus we have, as a basis for our argument, diminution in the daily quantity of urea eliminated, and an excess of phosphates.

Physiologists have given us as a normal standard, with a mixed diet for the twenty-four hours' elimination, about the following: Total amount of urine, fifteen to sixteen hundred c.c. This should contain about sixty grams of solids, of which about thirty-five grams should be urea, while we have only three and a half grams of phosphoric acid with which to form phosphates. Now, as urea, or its antecedents, when retained in the system, becomes a systemic poison, and often produces sudden death by overpowering the centers of respiration and of the heart, and sometimes produces violent convulsions, it is not unreasonable to conclude when a very small amount is retained each day (not enough perhaps to produce the overpowering influence referred to) that the nerve centers must show the toxic influence by slighter symptoms, such as we find in neurasthenia and other functional nervous disease.

The muscular tissue forms about forty-two per cent. of the body weight, and contains seventy-five per cent. of water and twenty-one per cent. of proteids, or about one-half the proteid material and water contained in the whole body; thus the muscular tissue is the most abundant and the most important tissue of the body, as nitrogenous waste is more abundant in the muscles than the other tissues of the body, and the final result of this metabolism is urea. After the food has been assimilated, and is a part of the body, the theory is that the proteid substances break down to form urea, or, in other words, in the process of metabolism, anabolism, and the building up, and the katabolism or the breaking down, goes on perfectly in the healthy individual; and the antecedents of urea, formed by proteids by katabolism very largely in the muscular system, is carried to the glandular system, particularly to the liver, to be converted into urea. But in the individual of sedentary habits and with a good appetite, who uses his brain extensively and his muscles but little, the conditions are liable to be changed; assimilation and anabolism may go on fairly well, but katabolism is diminished, the formation of urea is lessened, and the excretion of urea is, of course, below the normal.

On the other hand, the excess of phosphates in the urine shows imperfect anabolism of the brain cells, an imperfect assimilation of the phosphorized substances in the food, or an excessive katabolism of the brain and nerve cells. We must here eliminate cases of structural change in the kidney, for these conditions may, and do, exist without any structural change of the kidneys whatever; the urea is simply not formed, and its antecedents remain in the system to produce vague and numerous nervous symptoms by toxæmia.

And interesting physiological fact is that muscular exercise does not seem to increase the elimination of urea on the day the exercise is taken, but on the following day the increase is marked, showing that while muscular exercise is most valuable for its elimination, there are certain physical and chemical changes necessary before the elimination as urea; therefore, the object of our treatment should be to aid, as much as possible, these changes.

I will give briefly the history of two cases under my care, together with an analysis of the urine in each case:

A lady about forty years of age, and weighing 140 pounds, who had spent the better part of the last five years in a sanitarium, consulted me in consequence of a train of nervous symptoms which, she asserted, she was sure would kill her, or send her to an insane asylum. Her bowels were obstinately constipated; and when they were moved by medicine or enema, she experienced great pain, followed by extreme fatigue and nervousness, accompanied by excessive cardiac palpitation.

She slept poorly, and would be awakened by palpitation of the heart; she could think only of herself, and could not concentrate her mind sufficiently to read the lightest work of fiction; her pupils were widely dilated; reflexes all exaggerated; she had formerly taken great pleasure in music, but an attempt to play upon the piano made her very nervous. The presence of those she loved best seemed to irritate her most; slight exercise caused great fatigue; her appetite was good. An analysis of her urine revealed the following conditions: Total amount in twenty-four hours, 1350 c.c. Reaction sharply acid; specific gravity (corrected for 70 F.), 1020; solids in twenty-four hours, 63 1-2 gms.; urea for twenty-four hours, 17 gms.; no albumen; no sugar; no bile; no inorganic sediments; no casts; earthy phosphates in great excess. Here we have the daily quantity of urine approaching closely to the normal for women—normal reaction, specific gravity within the normal limits, with an excess of solids, and only about half the daily amount of urea excreted, while the phosphates are in great excess. The weight and general appearance of this lady showed that anabolism was going on, while the amount of urea excreted gave evidence of the fact that the antecedents of urea were retained in the tissues. The phosphates, being in excess, helped to run the daily amount of solids above the normal.

But the most interesting feature of the case is that, as the patient improved, her urea increased and phosphates diminished until they both reached about the normal, when she was discharged cured.

In these cases pathologists tell us that they find a shrinkage of the cells of the brain cortex, and of the gray matter of the cord, and this seems reasonable, as there seems to be evidence of the fact that there is either a lack of assimilation, by the cells, of the phosphorized elements of the food, or perhaps of a decomposition of the phosphoric acid in the nucleus of the cells themselves; and these weakened centers receive and transmit false impressions, giving us the varied symptoms, both physical and mental, that we find in this peculiar nervous malady.

The next case is that of a gentleman weighing 230 pounds, who also thought that he was headed straight for the asylum; in fact, when he was introduced to me, before I could speak, he threw both arms around my neck and broke into violent weeping. He begged me, in the name of God and for the sake of his family, to save him from the lunatic asylum. He would sit in the midst of his family for hours and have nothing to say and brood over his misfortune; he took no interest in his affairs whatever; and, although a politician, he could not read the daily papers; he slept poorly, but had a good appetite, but took very little exercise; smoked moderately, but drank no intoxicants; he complained bitterly of pain in the brow; the reflexes were all diminished, and the knee jerk was absent on one side, the left, and present, to a slight degree, on the right. This led me to suspect a lesion of the spinal cord, and I accordingly gave a guarded prognosis. To my delight, however, and to my great surprise, and contrary to my expectations, he rapidly improved, and in a few months was able to resume his work, and is to-day apparently well. A careful analysis of his urine showed that he was passing 1400 c.c. in the twenty-four hours of neutral reaction, with a specific gravity of 1025, and 78 1-2 gms. of solids, and only 22 gms. of urea. No albumen, no sugar, no bile, no casts; urates normal, great excess of earthy and alkaline phosphates.

This case is similar to the case just reported, and as they are very nearly like the great number of cases of this kind, it will be well to consider the treatment based upon the hypothesis already outlined.

If, as has already been mentioned, metabolism takes place most extensively in the muscles of the body, and muscular exercise causes an immediate increased elimination of carbon dioxide, and an increased elimination of urea on the day following, it seems to conclude that muscular exercise should be an important factor in the treatment of these cases of neurasthenia. Besides, in muscular exercise in moderation we produce conditions favorable to brain rest, and only in long refreshing sleep can we expect to rest the tired brain cells and cause them to assimilate the material from the food necessary to their nutrition.

The question arises, What is the best method of administering the necessary exercise to these muscle cells to make them "hop around," as it were, and make their proper chemical changes, and thereby rid the system of poison? Massage, horseback riding, bicycle riding, walking, etc., are all good so far as they go, but they are all followed by fatigue, and these patients are already fatigued; they get up in the morning tired, and they go to bed tired. In electricity, however, we have a means of exercising not only the muscles of the body, but also the liver, the spleen, the kidneys, the stomach, and the intestines, and do all this in such a quiet, gentle way as to be rather restful to the patient, and leave him invigorated instead of fatigued.

It is my custom, in treating these cases, to begin by passing a very gentle galvanic current through the superior cervical ganglia, by placing a large pad over the solar plexus, or over the pit of the stomach, and, by a bifurcated cord, two small electrodes, one under each ear. This current, which should not be strong enough to produce uncomfortable dizziness, is allowed to pass for five minutes. Thus we gently stimulate the cells of the cortex cerebri and of the spinal cord; and through the pneumogastric we influence the stomach and intestines and increase their secretions; and, as the cells in the brain and spinal cord are toned or gently stimulated, they are better prepared to transmit to the muscles and glands, when these are exercised or stimulated, that degree of healthy energy so necessary to enable them to function physiologically, and to produce those chemical changes so necessary to perfect nutrition.

This treatment is followed by general galvanization, and then by general faradization, as described years ago by Dr. Rockwell of this city, an esteemed member of this association. My method of applying general galvanization is to place a pad, at least twelve inches square, on the bed, table, or operating chair, and allow my patient to lie on this pad, which is placed so as to cover the lumbar and lower dorsal spine; then, with an interrupting hand electrode, I go over every muscle of the body and produce gentle contractions; this acts directly upon the muscle protoplasm, and by chemical action of the current upon the muscular tissue metabolism is aided. The same method is followed with the faradic current, and, as the contractions are produced by the action of this current upon the terminal nerve fibers, we must call into action also the motor and sensory cells of the cortex and of the spinal cord; and as we are told by physicians that before we can have a current flow from pole to pole all conductors within a specified area must be charged by induction, it is reasonable to conclude that all conducting material of the body is charged at every make and break of the current, and that absolutely no tissue of the body escapes the energizing influence of the electric current.

The liver, the stomach, and spleen are all treated in their turn as they are reached, and when this is finished the patient is placed in my ozone cage and treated to the soothing spray for from ten to fifteen minutes; during this time he inhales deeply the ozone generated in the cage. In a very short time his sleep improves, his bowels become regular, and he takes normal exercise without fatigue; an analysis of the urine will show an increased elimination of urea and diminution of phosphates, and as improvement continues these products of katabolism approach nearer and nearer the normal to complete recovery. If, after galvanic and faradic treatment, the patient experiences a sense of fatigue, he is allowed to remain in the static cage ten to fifteen minutes, and, upon coming out, he usually experiences a feeling of exhilaration which is followed in a short time by drowsiness and desire to sleep, and this sleep is usually very refreshing and followed by much relief from fatigue and nervousness.

The static cage I have found most beneficial in all cases requiring a soothing effect, and at the same time gentle general stimulation. A number of hard-working lawyers and statesmen have taken treatment after the days of toil and struggle, and have invariably expressed themselves as materially relieved and rested, enabling them to attend more thoroughly to their business the following day.

Since I introduced this particular form of cage with the tinsel brushes of the profession, in a paper read before this association, at Toronto, in 1895, I have treated beneficially by its aid many functional nervous troubles, and have had a great many letters of inquiry concerning its construction and general utility. Among others, I received a letter from Dr. Monell of Brooklyn, requesting a general description, the cost of making, the class of cases treated therein, etc. This letter I now have in my possession, and may be seen and read by anyone desiring. You can imagine my surprise when a cut of this cage appeared recently in Dr. Monell's book as the product of his own brain.

Many cases of neurasthenia have been treated in this cage alone, and have been cured, but the class of cases now under discussion I have found more readily cured by the treatment already outlined, but even in these cases the static cage is invaluable.

Finally, in support of my argument, I quote the following text from Landris and Sterling's Physiology: " A motor nerve excites chemical destructive changes in a muscle, and is so far the katabolic nerve of that tissue; in the same way the sympathetic to the heart, by causing more rapid contractions, is also a katabolic nerve, while the vagus, as it arrests the heart's action, brings about constructive metabolism of the cardiac tissue, is an anabolic nerve."

EPITOMES.

THE X-RAY IN MEDICINE AND SURGERY.

Before the New York Academy of Medicine, at the January meeting, Dr. Francis H. Williams of Boston read a very interesting paper on the " Uses of the X-ray in Medicine," especially showing its value in physical diagnosis.

The diseases and conditions enumerated and dwelt upon as readily diagnosed with the X-ray as an auxiliary, include: incipient phthisis, central pneumonia, empyema and œdema of the lungs, the position and size of the heart, calcification of arteries, aneurisms, the outlines of the pelvis (for the purpose of determining contractions, etc.), and new growths. The latter may be outlined and their development noted. The dangers of X-ray examinations were due to faulty technique, among a thousand cases examined at Boston City Hospital not a single case of X-ray dermatitis having followed.

At the same meeting Dr. Robert Abbe discussed " The Value of the X-ray in Surgery." Its great diagnostic value in certain fractures, and its employment in setting the fragments and watching the progress of unification was emphasized. Cases of non-union may now be quickly detected, and fractures of the vertebræ and their encroachment on the vertebral canal readily diagnosed. Its value in locating bullets, needles, and other foreign bodies in the organism was also enlarged upon.

The value of " The X-ray in the Detection and Exclusion of Renal and Ureteral Calculi " was also discussed by Dr. Charles L. Leonard of Philadelphia. He asserted that X-ray diagnosis was more definite and precise than any other present method, even minute calculi being recognizable. The value of early detection of calculi was emphasized, as nephrolithotomy when performed early has a mortality of two or three per cent., while when employed in later stages, when infection has taken place, the mortality was as high as 25 per cent. In over one hundred cases he had made a negative diagnosis and in only one had this diagnosis been set aside by subsequent operation, and in this case the error was clearly traced to faulty technique.

" Skiagraphy of Biliary Calculi " was treated by Dr. Carl Beck, who claimed that improved technique had enabled him to diagnose the calculi in several cases. The vacuum tube for such work must be able to stand a current from a coil giving a fifteen-inch spark. In skiagraphing biliary calculi the patient should be in the abdominal position, the X-rays being sent obliquely, so as to pass through the smallest amount of tissue.—Medical Record.

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THE ELECTRIC TREATMENT OF CHRONIC GLAUCOMA.

Dr. M. E. Valude of Paris has recently published an account of a new method of treatment for chronic glaucoma.

The results of resection of the cervical sympathetic led Dr. Valude to experiment whether it were not possible to reduce the tension in a glaucomatous eye by the sedative action of electricity on the sympathetic, and by destroying—temporarily, at least—the excitability thereof.

The method employed is to apply the negative electrode (one about 300 sq. cm. in size) to the nape of the neck. The electrode attached to the positive pole is about 8 or 10 cm. long, 2 or 3 cm. wide. This must be very carefully protected by the ordinary coverings, and an additional layer of cotton-wool, and applied, after being soaked in hot water, to the anterior border of the sterno-mastoid in its whole length.

It is secured in place by a bandage. The current used is one of 20 milliamperes, the electromotive force of 20 volts, and is allowed to pass for fifteen minutes. The treatment is used once every three days.

Notes of six cases are given, in all of which very material benefit resulted from the treatment, and the author concludes that in simple chronic glaucoma, if myotics have done all they can, and the disease still progresses, this form of galvanization, with the sedative effect of the positive pole, should be tried before any operative interference is suggested, especially before the sympathetic ganglion is excised, an operation which is difficult to perform, and has even in the most skilled hands been followed by the sudden death of the patient from cardiac disturbance.

THE X-RAYS IN SURGERY.

The Committee of the American Surgical Association on the medico-legal relations of the X-rays, after reviewing the evidence available on the subject, reached the following conclusions:

(1) The routine employment of the X-ray in cases of fracture is not at present of sufficient definite advantage to justify the teaching that it should be used in every case. If the surgeon is in doubt as to his diagnosis he should make use of this, as of every other available means, to add to his knowledge of the case, but even then he should not forget the grave possibilities of misinterpretation. There is evidence that in incompetent hands plates may be made that will fail to reveal the presence of existing fractures, or will appear to show a fracture that does not exist.

(2) In the regions of the base of the skull, the spine, the pelvis, and the hips, the X-ray results have not as yet been thoroughly satisfactory, although good skiagraphs have been made of lesions in the last three localities. On account of the rarity of such skiagraphs of these parts special caution should be observed, when they are affected, in basing upon X-ray testimony any important diagnosis or line of treatment.

(3) As to questions of deformity, skiagraphs alone, without expert surgical interpretation, are generally useless, and frequently misleading. The appearance of deformity may be produced in any normal bone, and existing deformity may be grossly exaggerated.

(4) It is not possible to distinguish after recent fractures between cases in which perfectly satisfactory callus has formed and cases which will go on to non-union. Neither can fibrous union be distinguished from union by callus in which lime salts have not yet been deposited. There is abundant evidence to show that the use of the X-ray in these cases should be regarded as merely the adjunct to other surgical methods, and that its testimony is especially fallible.

(5) The evidence as to X-ray burns seems to show that in the majority of cases they are certainly and easily preventable. The essential cause is still a matter of dispute. It seems not unlikely, when the strange susceptibilities due to idiosyncrasy are remembered, that in a small number of cases it may make a given individual especially liable to this form of injury.

(6) In the recognition of foreign bodies the skiagraph is of the very greatest value; in their localization it has occasionally failed. The mistakes recorded in the former case should easily have been avoided; in the latter they are becoming less and less frequent, and by the employment of accurate mathematical methods can probably in time be eliminated. In the meanwhile, however, the surgeon who bases an important operation on the localization of a foreign body buried in the tissues should remember the possibility of error that still exists.

(7) It has not seemed worth while to attempt a review of the situation from the strictly legal standpoint. It would vary in different States and with different judges to interpret the law. The evidence shows, however, that in many places, and under many differing circumstances the skiagraph will undoubtedly be a factor in medico-legal cases.

(8) The technicalities of its production, the manipulation of the apparatus, etc., are already in the hands of specialists, and with that subject also it has not seemed worth while to deal. But it is earnestly recommended that the surgeon should so familiarize himself with the appearance of skiagraphs, with their distortions, with the relative values of their shadows and outlines, as to be himself the judge of their teachings, and not depend upon the interpretation of others who may lack the wide experience with surgical injury and disease necessary for the correct reading of these pictures.

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SPINAL IRRITATION.

BY ALBERT C. GEYSER, M. D., NEW YORK CITY.

HISTORY.

This affection, no doubt, is as old as mankind; no nation under the sun, no part of the globe inhabited by man is free from it. The more civilized, however, a nation becomes, the more frequent we find this ailment; and yet, strange as it may seem, it is the least recognized as a disease a priori.

True the symptoms, being of such a decided nature, could not have escaped observation; on the contrary they have been written about and thoroughly recognized; but mostly as a concomitant condition in connection with some other disease, or where no other disease could be found associated with it, under such terms as hysteria, neurasthenia, neuralgia, tender spine, lumbago, rheumatism, cardiac and gastric neuroses, and other terms equally vague in their meaning.

This is not to be wondered at if we stop to think of the symptoms that follow in the train of this affection. Most medical practitioners who have attended to the subject of spinal troubles must have observed that its symptoms frequently resemble various and dissimilar maladies, and that, commonly, the function of every organ whose nerves originate near the seat of disorder is impaired. The occurrence of pain in distant parts attracts our attention, and should induce frequent examination of the spinal column; for more or less pain will be felt by the patient on the application of pressure and the galvanic- or faradic-current tests. Unless these spinal examinations are made we are led to treat a condition manifesting itself in organs supplied by the spinal nerves, especially cardiac and gastric disorders. It may almost be laid down as a rule that in all cases of tenderness of the cervical and upper dorsal spine there are nausea, vomiting or pain in the stomach, or affections of the upper extremities, but no pain in the abdomen or lower extremities. Again, that in all cases of dorsal tenderness, pains affecting the abdomen, bladder, uterus, testes, or lower extremities are usual symptoms; while nausea, vomiting, or affections of the upper extremities are never complained of.

Again, when several points or a great extent of the spinal column is painful and tender on pressure, there is a strong disposition to transference of the disordered action from one organ to another, the pain and tenderness in all such cases of transference shifting its place to a corresponding part of the spinal column, leaving the original points free or with a diminished degree of tenderness.

Bearing these few points in mind, it is no wonder that this disease masquerades under so many aliases; that these cases drift from one office to the other, until, at last, either the true cause is recognized, or, as frequently happens, some wide-awake physician possessing a static machine treats the spine on general principles, and, lo and behold! the patient is cured, the static current is spoken of and credited as being a good auxiliary to general medicine, when it should have been classed as a specific of the first order.

CAUSES.

Sex does not seem to play an important part; females, however, are slightly in preponderance; neither is age, especially after puberty, an important factor. Hereditary influence is another factor in regards to which it is almost impossible to obtain any definite information.

Even the exciting cause may not always be apparent. Reviewing them in the order of their frequency we have the following: in fifty per cent. it follows blows, falls, strains, or excessive muscular exertion; in twenty per cent. it was obviously and admittedly caused by sexual excesses; in fifteen per cent. it was apparently due to anxiety, grief, or other depressing emotions; in ten per cent. it followed exhausting diseases, such as typhoid, scarlet, intermittent and remittent fevers, dysentery, diphtheria, cystitis, gonorrhea, and leucorrhœa; in five per cent. the cause was doubtful. From these enumerated causes it will at once be apparent that, whether caused by direct injury to the parts or by general lowering of the vitality, the local resistance of the spinal region is diminished, and from its important anatomical and physiological relations, is very likely to become the seat of future trouble. Especially is this true when we consider any one of the three elements a necessary factor, viz: spinal compression, spinal congestion, and spinal anæmia. Compression, as caused by an increase in fibrous tissue surrounding spinal nerves at their exit, is caused by increased activity, the result of direct trauma or inflammation. Congestion and anæmia not only follow as a consequence of previous injury, but the emotions and psychical causes here play an important part.

SYMPTOMS.

The symptoms of spinal irritation, though numerous, admit of very exact classification and recognition; but it would be too much to expect that in this, or, in fact, any other disease, each patient should exhibit in his or her person the whole category of morbid phenomena which go to make up the pathological entity called spinal irritation.

The spinal cord is a long organ, and while one part may be affected by any one of the three previously mentioned factors, the rest may be comparatively healthy. For convenience and simplicity the symptoms may be classed under two heads, the centric and eccentric. As the terms imply, the centric symptoms are those which are exhibited by the diseased part of the cord or its immediate contiguous structures; the eccentric those which are developed in the remote parts of the body.

CENTRIC SYMPTOMS.

1. Tenderness at some one or more points over the spinal column, increased by pressure. This is the essential symptom of spinal irritation, though varying in intensity from the slight degree of pain experienced upon strong pressure, to the acute hyperæsthesia which does not allow of even the contact of the clothing without the production of great suffering. It is generally complained of by the patient, though occasionally it has to be sought for by the physician, and can be elicited in over eighty per cent. of cases. The seat of tenderness is generally in the dorsal region of the spine. In twenty-eight cases treated, of which this paper is a résumé, cervico-dorsal tenderness was found in four cases, lumbar and dorsal in nine, while dorsal tenderness alone was present in fifteen cases.

The degree and character of the tenderness are subjected to great variation. In some cases strong pressure is required to develop it, while in others the least touch is insupportable.

Sometimes there are shooting pains, which radiate from the tender spot to distant parts; while at others the hyperæsthesia is quite circumscribed. The pain developed by pressure is not always the same. Sometimes it is dull and aching, and at other times sharp and lancinating. Definite relation between the character of the pain and the severity of other symptoms has not been found to exist. The dull aching sensation is only developed by strong pressure, and is seated in the muscular, tendinous, and cartilaginous structures about the vertebræ. The sharp, piercing twinges excited by slight pressure arise from the skin and subcutaneous cellular tissue.

To ascertain whether or not the tissues outside of the spinal canal are in a state of hyperæsthesia, the pressure should be made with gradually increasing force, by means of the thumbs applied to the spinous processes and the intervertebral spaces. The examination should be thorough and extend throughout the whole length of the vertebral column.

2. Pain in the Spinal Cord.—It is a very common symptom.

This is the condition generally referred to as "tender spine." It is incapable of being produced by pressure upon non-tender spots; but readily manifests itself by motion of the spinal column, by action of the muscles which have their attachments to the spinous and transverse processes, by percussion, the passage of the galvanic or faradic currents through the parts, sometimes even by the erect posture, and, last but not least, this local pain is markedly influenced by mental disturbances, especially those of an emotional character. To ascertain the existence of this spinal pain, when not spontaneously felt or induced by muscular exertion, percussion may be practiced. A soft rubber hammer, and, for a pleximeter, a small coin such as a silver twenty-five-cent piece, answers the purpose. Even over spots which exhibit much tenderness, the deep-seated pain of the cord can be clearly distinguished. Another method, and perhaps a surer guide than either of the preceding, is the galvanic- and faradic-current test.

ECCENTRIC SYMPTOMS.

The most important and noticeable symptoms of spinal irritation are to be found in distant parts of the body. Important, because they do not at once indicate the proper seat of the disorder, nay, more than that—they are very apt to mislead us and cause an organ to be subjected to treatment that cannot recover without applying the treatment at the root of the disease. Here the saying is only too true: Remove the cause and the symptoms disappear.

Among the more prominent eccentric symptoms we find headache, dull aching browache, neuralgia of the face and scalp; the intercostal neuralgias are a common type: cardiac disturbances, as nervous palpitation; gastric disorders from dyspepsia to nausea, even the immediate expulsion of food soon after ingestion; muscular soreness; neuralgic pains radiating to the extremities, and a host of lesser symptoms.

DIAGNOSIS.

Recollecting that no case is to be regarded as one of spinal irritation which is not characterized by spinal tenderness, we have our diagnostic inquiries limited to the distinguishing of spinal irritation from other spinal affections. It is certainly true that the distinction has often been overlooked, and at times there is a real difficulty in forming a correct judgment. Nevertheless, by carefully estimating all the circumstances, permanent errors of diagnosis are not likely to occur.

There are three diseases of the spinal cord which may in their earlier stages be confounded with simple spinal irritation. These are chronic myelitis, meningitis, and congestion. As the treatment of these affections is in many respects the exact reverse of that proper for spinal irritation, and as they are of far more serious character, it is important to make as early and as correct a discrimination as possible.

In both spinal irritation and myelitis there is tenderness over some part of the vertebral column, which tenderness is increased by pressure, but this tenderness is never due to hyperæsthesia of the skin, whereas in spinal irritation it often is. In spinal irritation there is never anæsthesia; whereas this is a constant accompaniment of myelitis.

The contractions which take place in some cases of spinal irritation are painless, while those due to myelitis are attended with great suffering.

In myelitis there is a sensation as if a tight cord were tied around the body at the upper limit of the paralysis, a sensation which is always absent in spinal irritation.

The bladder is scarcely ever paralyzed in spinal irritation, whereas in myelitis it generally is, if the inflammation be located in the lower dorsal region of the cord. The same is true of the sphincter ani. Myelitis is always productive of paralysis; and there is always more or less atrophy of the paralyzed muscles. Spinal irritation seldom gives rise to paralysis; when it does result, it is always complete, and is never productive of atrophy.

The progress of myelitis is generally, unless arrested by appropriate treatment, toward a worse condition; whereas no such tendency is manifested by spinal irritation.

From spinal meningitis, spinal irritation is distinguished by the fact that in the former disease there are constant painful spasms of the muscles of the back, pain in the cord, and no spinal tenderness increased by pressure.

From congestion of the spinal cord and its membranes, spinal irritation is sufficiently distinguished by the fact that there is little or no pain in the cord in the first-named affection, and no spinal tenderness. In congestion, likewise, the paralysis and other symptoms are always worse after the patient has been lying down,. while in spinal irritation the recumbent position always alleviates the condition.

The flatulence, eructations, and vomiting are very symptomatic of spinal irritation, while they are rarely phenomena of either of the other affections.

One other disease is liable to be confounded with spinal irritation, and that is angular curvature, in which there is spinal tenderness increased by pressure. The facts, however, that strumous disease of the vertebræ generally occur in children, that the scrofulous diathesis is always present, that an angular prominence can be detected by careful examination, that the paralysis progressively becomes more profound, that the constitutional effects are more severe, are sufficient, even in doubtful cases, to guide to a correct diagnosis.

ELECTRICAL TESTS.

Place a large electrode, say six by eight inches square, over the solar plexus and connect it with the positive pole of a galvanic battery. The negative pole should be attached to a soft sponge electrode about the size of a silver fifty-cent piece, beginning at the upper cervical vertebræ, slowly increasing current to about 10 milliamperes. Upon the current traversing a painful aréa, an acute sensation will at once be felt by the patient and promptly responded to. In a few cases a current as high as 20 milliamperes may be necessary to elicit tender spots.

In using the faradic current the primary coarse wire should be made use of, the current is allowed to flow to point of tolerance in cervical region, then passed over the entire spine and points of differing tenderness noticed.

PROGNOSIS.

The prognosis in cases of spinal irritation is exceedingly good under electro-therapeutic treatment, especially so in conjunction with medicinal tonics which are capable of exerting a specific influence over the spinal cord and its region.

TREATMENT.

Bearing in mind the previously enumerated conditions, treatment becomes simplicity itself.

The principles of treatment applicable to spinal irritation are four:

1. To remove the cause.
2. To improve the general tone of the system.
3. To increase the local circulation and thus increase the nutrition of the parts.
4. To set up a counter-irritant action in the vicinity of the disordered region of the cord.

(1) The first indication is one that common sense teaches relative to all diseases, the cause of which is still in operation.

(2) The general tone of the system should be improved by tonics, as iron, manganese, quinia, strychnia, mineral acids, and alcohol; lactophosphate of lime, singly or combined with quinia and strychnia in 1-2 to 1-dram doses, has proven itself of especial value as an improver of physical strength.

One of the most commonly employed combinations is as follows:

℞ Strychniæ sulphatis	gr. 1
Quiniæ sulphatis Ferri pyrophosphatis	aa ʒ 1
Acidi phosphorici diluti Syrup zingiber	aa ℥ 2
M. Ft. sol.	

Dose: A teaspoonful t. i. d., in a glass of water after meals.

This should be persisted in during the entire course of the treatment, lasting from two to eight weeks.

(3) and (4) are covered by the static and faradic current.

If ever there was a disease or a symptom suited to electric treatment, this is the one. With negative insulation the static spray, friction, and spark all are indicated, and should be used during a séance lasting about ten minutes daily, or at least on alternate days.

In some cases, especially children, it is well to begin with the high-tension faradic current; the longer and the finer the wire the better. In several cases of children the compound Kidder coil, full length, has given most excellent results.

The positive pole, consisting of a sponge terminal, moistened in a warm saline solution, the current gradually increased to a point of tolerance, then kept over the tender spots until more or less anæsthesia is produced, when the current should again be slightly increased; this procedure to be continued at each séance. Improvement will be manifested after the third or fourth treatment, while a cure can be hoped for in nearly all cases from four to eight weeks.

RÉSUMÉ OF DISCUSSION.

Dr. W. H. King: Dr. Geyser has probably had the same experience as I a great many times with regard to the use of galvanism in these conditions. In a case of severe spinal irritation, it makes no great matter which pole of the galvanic battery you use on the spine. One or two hours afterward the patient begins to feel exhausted, and day after day the exhaustion may be great for one to three hours, but they gradually begin to come up out of it.

I am a great believer in the static treatment; there is, however, a dividing line between the spray and the spark. In some cases the spray is a great factor for good; if you should use the spark in these cases it would irritate the patients. In other cases the spray seems ineffectual, and one is obliged to resort to the spark; it seems as if the spark had a general tonic effect upon the patient. I would ask Dr. Geyser if the treatments with the faradic current give any noticeable relief. In using static I have known relief to continue for three hours after the first treatment; in the next treatment it may continue five or six hours; and you can make a prognosis, according to my experience, of how long it will take to cure, from the lengthening period of relief.

I am interested in the differentiation brought out, between spinal irritation and myelitis, and would like to ask what success—temporary or permanent—Dr. Geyser has had in sclerotic conditions.

Dr. Reading: In five or six cases of locomotor ataxia I have had under treatment I have succeeded in preventing an advance of the disease. We can never expect improvement after nerve cells are destroyed. I have in mind a case that has been under my care for five years and has not grown any worse. He is apparently the same as when I commenced to treat him. I have used the galvanic current more than static, putting a disk on the spine and the negative pole where the pains are and parts implicated. There has been no decided improvement in any case I have ever seen.

Dr. Geyser: You will have noticed that in this paper I studiously avoided the mention of galvanism, as in the treatment of spinal irritation it is not to be used under any circumstances. In differentiating between the use of the static spark or spray it is necessary to use much judgment. In those cases where the spark causes irritation, or where the patient becomes nervous, I use the compound Kidder coil, full length of wire. Having located the tender spot, I apply the current until the patient says " Enough "; the current is then diminished so that no irritation is felt, and gradually increased to the point of toleration. I have a device on my apparatus for recording the resistance the body offers; and I have kept a fairly good record of progress. I have treated many cases in this way with excellent results. As the treatment is carried out I notice the resistance of the patient becomes less. I have not tried the static-induced current to any extent. I have had such good results from the others that I did not care to experiment further.

With regard to sclerosis, I have had one or two cases of locomotor ataxia to treat. They did fairly well. In one case the disease remained stationary; in another there was marked improvement. I have in mind a case that was unable to do anything for himself when he came to me; now he holds two paying positions, one in the daytime, the other from six to eight in the evening. Of course cell degeneration prevents relief; but some cells are left, and it is these we stimulate and make to take the place of the others to a certain extent.

THE VALUE OF TRANSILLUMINATION IN DISEASE OF THE NASAL ACCESSORY SINUSES.

BY THOMAS L. SHEARER, M. B., C. M. EDIN.; BALTIMORE, MD.

There is probably no subject, at the present day, that is attracting more attention from the rhinologist than that which deals with suppurative processes in the nasal accessory sinuses. So many conditions of the nasal passages owe their existence to pathological states of these small cavities that any case of apparently simple chronic nasal or naso-pharyngeal catarrh should be entitled to a careful examination of the neighboring spaces. The day has passed when it is considered sufficient to merely content ourselves with ordinary anterior and posterior rhinoscopy. As this paper deals only with the subject of transillumination, I must necessarily omit any consideration of the other and valuable methods of diagnosis employed in ascertaining the source of purulent nasal discharges. After Czermak had suggested the use of transmitted light for the examination of the larynx, Voltolini tried transillumination in the diagnosis of thickening of the alæ of the thyroid cartilage in cases of perichondritis of the larynx. He also applied the same method to examination of the facial bones and ascertained that, when the bones were not unusually thick, they transmitted the rays of light. Heryng, in 1889, perfected this method, employing a five-volt electric lamp, which was fastened to a tongue depressor—the kind introduced by Turck. Heryng has since then improved his lamp so that it may be used for illumination not only of the antrum, but also of the frontal sinuses and the larynx. Sometimes, in a very dark room where all light may be excluded, the examination can be made without any head covering, but it is usually more satisfactory to darken the room as much as possible, and then to envelop both the heads of the patient and the examiner with a cloth similar to that used by photographers. The lamp is then placed in the patient's mouth close up to the palatal roof, and the lips tightly closed. It is, of course, very important to remove any dental plates. If now the current is turned on the light should pass through the (healthy) antrum, a crescentic bright region appear under the eye, and in some instances the pupil may become lighted up. Some patients have the subjective sensation of light in the eye with the eyes closed. If the antrum is filled with pus or with any other opaque material, both the infraorbital area of light and the sensation of light are usually entirely wanting. As a means of diagnosis this method has its value, but its absolute reliability unfortunately is impaired by the existence of other and varied conditions that are encountered in these localities. In examining the frontal sinuses, the electric lamp is covered with a thick piece of rubber, open at the end, so that the light can be thrown in one direction only. The rubber is placed against the roof of the orbit, but not too near the thick orbital ridge, and pressed upward, inward, and backward. The sinus, if healthy, may be thus lighted up, and an area of illumination appear. If one side is dark and the other light, the dark side may contain pus; but we must remember that the frontal sinus is so irregular in size and shape that

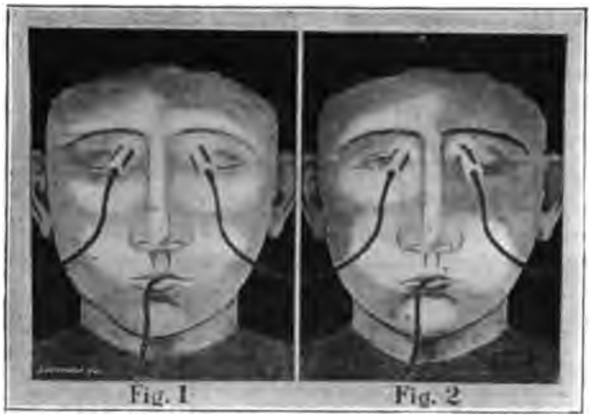

Fig. 1.—Transillumination of both maxillary antra by electric light in mouth, and of both frontal sinuses by lights under the orbital margin.

Fig. 2.—Failure of transillumination of antrum and frontal sinus on the *left*, while both are lighted, and the pupil also on the *right*.

too much reliance must not be put on this point. The method should always be used as at least one means of diagnosis. In the case of the antra of Highmore, many observers, such as Voltoli, Heryng, Luc, and Rualt, whose investigations we must respect, have had the experience that, in many instances, if the antrum is healthy, an area of infra-ocular translucency is observer when transillumination, as described above, is employed. The absence of this crescent or a marked diminution of transparency on one side is the differential feature in the diagnosis.

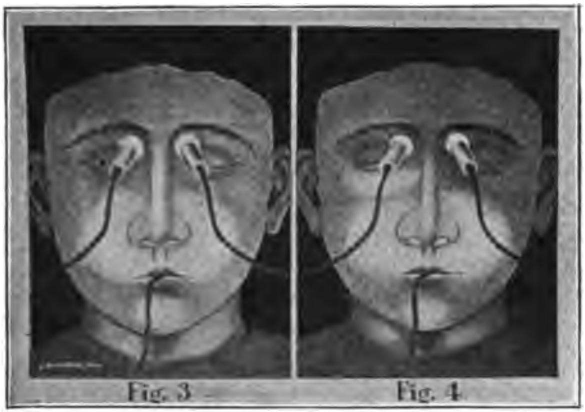
Fig. 3 Fig. 4

Fig. 3.—Failure of illumination complete for frontal and maxillary sinuses of *both sides*.

Fig. 4.—Only the *right maxillary antrum* is illuminated, while both frontals remain dark.

Rualt remarked that "we can have opacity without empyema; but we cannot have empyema without opacity." With this statement I cannot entirely agree; for while sometimes the umbra may be present and no empyema, there may be intranasal trouble, or some anatomical conformation of the hard palate by which the light is thrown into the nasal cavities instead of through the narrowed antrum. But another element of uncertainty is that the cavity under examination may have just been emptied, and at the time not contain sufficient pus to produce the umbra, a slightly dimmed crescent of light taking its place. Grunwald and many others have found a cavity dark on transillumination, which contained no pus, and one clear, which undoubtedly was suppurating. Davidsohn claimed that the chief diagnostic point is not the infra-orbital umbra or the crescent, but the appearance of the eyes, which are said to look uniformly clear and bright in a normally formed skull with a flat palate and a clear antrum. But I am sorry to say that this symptom of Davidsohn does not assist us to any appreciable extent, as the thickness of bone, the quantity of pus present, and the amount of light necessary to illuminate the faces of different people must vary greatly. These, as well as other conditions, unfortunately do not allow of our having a standard or constant result in all healthy, normally formed skulls with which we may compare different cases in which we suspect pathological states. If, however, the umbra is seen over one infra-orbital region, which clears up after the pus has been taken away, we may from time to time use trans-illumination as a means of comparison, for here we have our standard for this individual. In view of the most recently recorded list of cases in which death occurred after the most trivial operative measure upon the middle turbinated membrane, such, for instance, as linear galvano-cauterization, and that such fatal terminations were due to either meningitis or to abscess within the skull, Grunwald has claimed that many of these patients were sufferers from latent empyemas, which only required an irritant or a breach of surface to develop the dormant symptoms. Such a view, whether right or wrong, is advanced by so accurate an observer that it should prompt us to ascertain as best we may, the condition of the nasal accessory sinuses as regards suppuration, before we undertake the most simple nasal operations, particularly those which involve the middle turbinated membrane and its bone, for this portion of the nose, through the cribiform plate, offers a very easy path to the base of the brain. Trans-illumination, in any event, should be tried; and if opacity be present in an area which normally ought to be clear, the result should cause us to pause before setting up irritation in the nose; we may, at least, be spared a sudden distressing death after assuring the patient that our intended procedure is harmless. We must, however, never lose sight of the various points which may influence the interpretation of the umbra or the crescentic areas; to do so would be to incur great risks, to make grave errors in diagnosis, and, worse than all, to operate unnecessarily. After all, attractive as this method is, we must realize that it is merely a useful means of confirming the more decided symptoms, an adjunct to general diagnosis, and one we would do well to employ in every doubtful case. Its best work will naturally be done for the man of wide experience in its use; it is no instrument for the hand of the novice.

RÉSUMÉ OF DISCUSSION.

Dr. T. L. Shearer: The lamp used is a small incandescent—2 to 5 c.-p. Examination must take place in a dark room and the head be enveloped in a dark cloth such as photographers use. The instrumentation is simple; but the examination is often made difficult owing to large growths encroaching upon the nasal space.

STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

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CHAPTER IV.

THE DISRUPTIVE METHODS OF STATIC ADMINISTRATION.

Charging the machine, which is a prerequisite to every form of static application, under favorable atmospheric conditions, when the machine is in good order, is but the matter of a moment's time. In fact a machine in good condition, which is used every day, may not discharge for months, if care is taken to leave the discharging rods widely separated. If, however, moisture has gotten into the machine, or during periods of humidity, it will often tax the skill, patience, and energy of an adept to accomplish it.

(1) Make the necessary connections, which vary with different makes of machines, to place the Wimshurst in circuit with the Holtz.

(2) Separate the balls of the discharging rods about one-half inch and give the Wimshurst several vigorous turns before starting the Holtz (if the Wimshurst is operated by hand).

(3) Next start the machine, at the same time moving the Wimshurst rapidly, and almost instantly a torrent of sparks will pass and continue when the Wimshurst is at rest—the machine is then said to be charged.

(4) Cut the Wimshurst out of circuit and gradually separate the discharging rods; allowing the machine at the same time to run rapidly until a maximum charge is obtained.

If, as in machines of some manufacture, the Wimshurst is operated by the same power as the Holtz, both will start at the same instant, and under favorable conditions the machine

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will instantly charge. It is under the unfavorable conditions referred to that a few suggestions will prove of value; and it is then that it is better to have the Wimshurst under manual control.

If due to the condition of the machine, a problem which the hygrometer will determine, for if not due to the atmospheric conditions the fault must be with the Holtz or Wimshurst or both, after ten minutes' effort, employing the following maneuvers, prepare to put the machine in order and either replace the wet calcium by fresh, rebake it, or put in fresh lime; or, at this time, if the machine is in great demand, resort to the cracked ice and salt (see Care of Machine).

The maneuvers which succeed often under difficult conditions are the following:

(1) When the Wimshurst fails to give the usual one-half inch or longer spark, if revolved several times in the opposite direction, and then reversed, the current may be promptly excited.

(2) If, when rapidly moved, the Wimshurst will not generate a spark between the balls of the discharging rods at least three-eighths of an inch in length, it will cost a struggle to get the charge. One-half inch will usually succeed.

(3) Having carefully removed with a dry cloth or chamois all dust or moisture from the exposed metal parts of the machine in connection with the circuit, separate the balls of the discharging rods as far apart as a spark will pass when the Wimshurst is revolving rapidly. While rapidly turning the Wimshurst start the Holtz, at first slowly, at the same time, little by little increasing the length of the spark-gap, when after an instant, if sparks continue to pass between the balls, suddenly increase the speed of the Holtz, and the machine will either charge, or the sparks cease passing altogether. Shorten the spark-gap a trifle and repeat the maneuver. If this plan is tried over and over again, turning the Wimshurst very rapidly, starting the machine very slowly, and then increasing the speed, success will often reward the effort.

Failing in this, if the humidity is near eighty per cent. and there are no means for cooling the room and thereby condensing the moisture, there will be little use of continuing the effort, for under such conditions most of the current excited will pass away in the atmosphere, and no treatment prove effective. If, however, the fault is in the condition of the machine, and it is charged after much exertion, and the busy hours are at hand, do not let it once stop, nor close the conducting rods within one-half inch of each other until the last patient is treated, and then see that the machine is renovated.

If calcium is kept dry, or plenty of fresh lime is within the case during the heated season, such necessities will rarely arise except from the humidity. But that these precautions are not always taken, and that the knowledge is then valuable, is the excuse for devoting so much space to the subject.

The polarity of the machine changes from side to side while at rest or in taking a new charge without apparent cause. It is therefore necessary to have some manner of determining which is the positive or negative pole. The operator familiar with the work readily discerns the difference in the appearance of the discharge from the two poles when the discharging rods are separated just far enough that a spark will not pass—the fan-tail discharge from the negative radiating in straight lines from the ball, and the broken tree-like discharge from the positive. While charging, note the spark discharge between the balls—the bright dash will be on the positive side.

Two good ground connections are necessary, which we will designate as Nos. 1 and 2, to obtain the most potent effects when local connections, disruptive and convective discharges are employed. The water and gas pipe systems in city houses serve the purpose well. From rings or screw-eyes conveniently placed small wires may be run, one to the water pipe and the other to the gas pipe, or to two iron rods driven deep enough to be in constantly damp earth. To the rings or screw-eyes the chains will be conveniently connected during administrations. Always take care that the wires or chains conveying static electricity do not come in proximity to wires conveying the street current, or the fuses will be blown out, or possibly some wire or chain melted and the light and power cut out.

The forms of administration are varied in the methods of application and consist of sparks, also known as disruptive discharges; breeze, spray, and brush discharge, called also convective discharges; and currents or conductive discharges.

The oldest form of administration is sparks. Abbé Nollet in 1734 was the pioneer. Later Benjamin Franklin, John Wesley (the founder of Methodism), and others, are reported to have performed many cures by their use. Vigoreaux in Charcot's clinic brought the use of Franklinism into great prominence before the medical profession, and deserves the credit of its institution into more general medical use. Morton, a student of Charcot, brought the first influence machines to this country in 1881, and to his efforts and teachings the world is greatly indebted, both for a definite knowledge of a proper administration and correct electro-therapeutics.

The employment of sparks, painful and unpleasant as is the sensation, performs useful services which no other therapeutic measure can accomplish. In the administration of sparks, there is some diversity of opinion as to the effects of polarity. One patient will tell you that the negative spark is most painful, and another that the positive is. The facts are, there is little difference—both are painful and both are effective. The choice, however, is in favor of the positive spark—the spark of positive insulation, because a longer, cleaner spark is produced from that connection. The negative is more apt to split or divide, and does not seem to produce the same deep perturbatory effect. The spark of positive electrification is therefore the choice in all spark administrations. We therefore ground the negative pole of the machine, and connect the positive pole with the platform, in contact with the chain or plate, or chain of the plate. Take care that the metal parts are about one foot removed from the feet of the patient, lest sparks not intended pass; producing an unfavorable impression upon the patient of the operator's neglect or inexperience. Be sure that the platform is removed two and one-half to three feet from the machine, and never near or beneath a chandelier or other metal conductor. Place the chair upon the platform so that the patient sits directly opposite the prime conductor of the positive pole (the side connected with the platform). There are two reasons for this precaution: (1) Should the patient accidentally touch the ball he will get no spark, and (2) he will draw off none of the current and thus diminish the effect when, under certain conditions, all may be required.

The patient seated upon the platform, and the operating chain having been connected at one end with ground No. 2, the one not connected with the negative pole of the machine, and the other with the screw-eye in the side of the handle of the ball electrode to be used, see that the prime conductors are widely separated. (Care should be taken that the machine is charged before the patient is admitted to the operating room.) Start the machine at a rate of speed commensurate with the length of the spark to be administered; speed will vary much with weather conditions. Before administering the first spark to the patient, test the length by a discharge from the positive prime conductor, which will be somewhat longer than the discharge from the patient. At the instant immediately preceding the application of the first spark, or following intervals of rest during the treatment, place the ball, or one foot, against the platform to draw off the surplus of charge, or the first spark will be unnecessarily severe.

There are several common methods of regulating the length of the sparks to be administered: (1) the speed of the revolving plates; (2) the proximity of the plate or chain upon the platform with the person of the patient; (3) placing the discharging rods at varying distances, according to the length of spark to be administered; (4) by the operator drawing off a part of the current by the proximity of his person or clothing—stand away when long sparks are desired, and draw near, or place one foot upon the platform, when the shorter sparks are preferred. The latter plan is valuable when giving a patient a general treatment by sparks, when it is desirable to apply long sparks to certain parts of the body and shorter ones to other regions. (5) When powerful effects are sought, the patient may take the chain or shepherd's crook in his hands (a very disagreeable method for the patient, because of the painful contraction of the muscles of the hands), or stand with the shoes removed upon the metal plate. This plan will also be valuable during periods of humidity, when the output of electricity to the patient is small.

When administering sparks, use a wrist movement instead of the arm movement, which is awkward and tiresome. First measure the length of sparks by a few experimental applications, observing the preceding rules for regulating their length. Knowing at what distance from the patient a spark will be discharged, move the ball to that point and immediately retreat before a second spark escapes. Repeated sparks to the same point are exceedingly painful and disagreeable. With a little patience, employing the wrist movement, the knack of administration is soon acquired. A swinging motion, allowing single sparks to escape, as the ball is passed to and fro, is another method useful in applications to convex surfaces. When treating anæsthetic areas, or patients who are tolerant from familiarity or hardihood, much time may be saved by rapidly passing the ball electrode parallel with the surface of the body at such a distance that rows of sparks will be discharged.

The application of sparks in hollows or angles is often difficult of performance, as in treating the throat or perineum. The small ball electrode meets the difficulty in treating the throat; or, by using a spark director of glass or hard rubber, represented in Figs. 3 and 4, the sparks may be easily localized.

The size of the ball electrode determines the fatness or width of the spark. Remember that sparks applied over bony prominences do no good and are exceedingly painful; also avoid applying sparks to the breasts of the female and external genitals of the male, also to the nails of the fingers and toes. When administering sparks, breeze, spray, or brush discharge over wet clothing and certain fabrics (especially cotton), the effect is abortive. Over such garments place some good nonconducting material—a piece of woolen cloth or even a newspaper.

Sparks may be classified as (1) direct, (2) indirect, (3) friction, and (4) Leyden jar; and their peculiarities, indications, and mode of application described as follows:

I. *The indirect spark* is the form indicated in most instances where sparks should be administered. We will repeat here only the mode of making the connections. (1) By means of a chain connect the negative pole with a direct metallic ground connection (ground No. 1). (2) Place the insulated platform two and one-half to three feet from the machine. (3) Connect the other side of the machine with the platform, using the shepherd's crook, rod, or chain; whichever is provided for the purpose. (4) Separate widely the discharging rods. (5) Connect the operating chain, having ball electrode attached to a second good ground connection (ground No. 2). (6) The patient having seated himself upon the platform, start the machine.

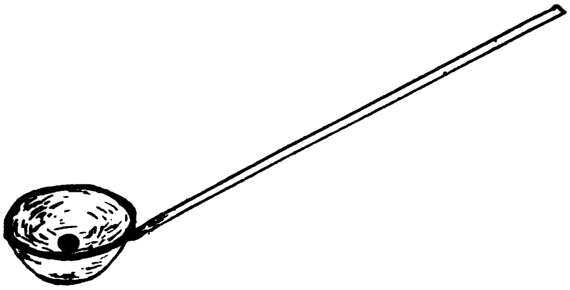

Fig. 3.

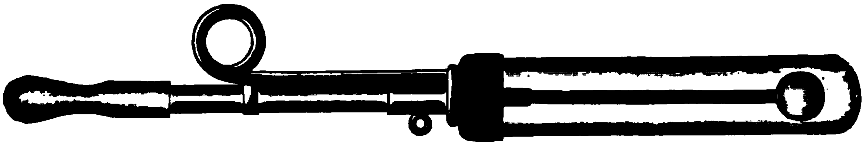

Fig. 4.

II. *The direct method* is employed only during periods of humidity, when it is found impossible to use the indirect spark. This spark is much more painful and can rarely be administered in single sparks. During the administration, the operator's chain must be held with the chain holder in the left hand of the operator in such a manner that it does not come in contact with himself or the patient, while the sparks are administered with the ball electrode in the right hand. The mode of connection is as follows: (1) Place the platform and connect it with the positive pole of the machine by crook, etc., as in the preceding method. (2) Separate the discharging rods widely apart. (3) Connect a short operating chain to the negative side of the machine, and place the spiral chain holders at about the center of the chain. The patient seated, start the machine.

III. *The friction spark* is administered by rapidly passing a metal electrode over the clothing or hair, all connections being made identically as when administering the indirect spark (during periods of humidity the indirect method may be employed). The thickness of the material intervening between the surface of the body and the electrode determines the length of the sparks. The roller electrode was originally intended for use in this form of administration, but is not nearly so good nor convenient in our experience as the large ball electrode provided with a handle, having a long metal portion above the insertion of the insulated part. Applying the ball and handle in making the applications, it can be moved rapidly and efficiently over any surface of the body. If making a general application of friction sparks, pass the ball and metal portion of the handle very rapidly over the body by long strokes, and when treating small areas pause at short intervals, and the patient will submit to all the application the case demands. This form of application relieves pain, is highly stimulating to the peripheral circulation, acts as a counterirritant, and promotes secretion.

IV. *The Leyden-jar sparks* are too severe for administration, except in cases calling for some profound mental effect of discipline or suggestion. They would be administered by the same arrangement as the direct sparks; adding two Leyden jars having their outer coats connected by a device provided for the purpose, or a metal rod.

THE ELECTROSTATIC CURRENT IN THE CURF OF CONSUMPTION.*

BY MARVIN A. CUSTIS, M. D., WASHINGTON.

The use of the electrostatic current in the cure of consumption is of recent date, yet its use in this generally ungovernable disease has proven beneficial, to say the least; and when this current is used in conjunction with germ-destroying solutions in the so-called "transfusion method," its action is nothing short of curative.

The beneficial action of positive insulation, not only in consumption but in other conditions, is above dispute. For some little time past I used the positive insulation alone in this disease; then I began to use the positive insulation and positive breeze to the chest at alternate treatments.

Several years ago, when the inhalation of germ-destroying vapors were first brought to my attention, I tried them and found good results to follow the inhalations, especially by the "bib-method," of a five per cent solution of formaldehyde.

Although finding good results following the use of the electrostatic current and the inhalation of the formaldehyde, it never occurred to me to combine the two until my attention was called to a paper presented to the French Academy of Science, advocating the use of "electrically diffused formaldehyde" in this disease.

For the past ten months I have been using this current in conjunction with formaldehyde in the so-called "transfusion-method" with what may be called excellent results.

By means of static cataphoresis—for that is what the "transfusion method" really is—the vapor of the formaldehyde is transfused in the tissue of the chest and lung, causing destruction of the bacilli with which it comes in contact. And, so far, there has been no bad results from the static cataphoric treatments.

The results of these treatments in consumption are far more favorable than the results obtained by any other method of treatment.

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* **Read before the Medical Society of Washington.**

Of eight hundred cases treated by this method and reported to the International Medical Congress, convened in Paris this last summer, six hundred were completely cured. In conducting these experiments the physicians divided the cases of consumption into three classes, viz.:

(1) Those who were in the first stage of consumption, or favorable cases.

(2) Those who had reached the second stage of consumption.

(3) Those far advanced in the disease, and who, under ordinary circumstances, would be considered incurable.

Now, give strict attention to the results of treatment by this "transfusion-method." In the first class, or those in the first stage of consumption, the cures reached 100 per cent.; while seventy-five per cent. of those in the second class were cured; and in the third class, or the hopeless cases, 30 per cent. were cured.

My favorite solution is one consisting of one ounce of a forty-five per cent. solution of formaldehyde and seven ounces of distilled water, to which is added one dram of cinnamon water, to make the treatment more pleasant to the patient. Eucalyptus, as well as hydrastes, is sometimes added to the solution for its supposed curative properties.

In giving the treatment, the patient is seated upon the insulated platform, which is connected with the negative pole of the machine; cloths wrung out of the formaldehyde solution above referred to are applied to his chest, and the point electrode, or concentrator, connected with the positive pole of the machine, is directed to that part of the chest covered by the cloths.

Personally, I prefer to use, in place of the point electrode, a brush electrode, made of many rather coarse wires, which is attached to the concentrator by means of a sleeve and directed to the chest.

Of course, other solutions, rather than the one of formaldehyde mentioned, may be used; and one may use specially-made static cataphoric electrodes if they wish; but these special electrodes possess no advantages over the brush electrode, as used above, except when it is desired to localize the treatment, or when using substances that must first be volatilized by heat; in the latter case the special electrode must be used.

In these treatments the patient gets the benefit not only of the "transfused formaldehyde," but also of the inhalation of a certain amount of the vapor of the formaldehyde and of the ozone, which of necessity is generated.

The treatment should be from ten to fifteen minutes in length and repeated about every third day.

Instead of applying the cloths to the chest, I find by inserting cotton, previously saturated in the formaldehyde solution, into the ordinary ozone generator of the McIntosh make, and applying this near to, or in actual contact with, the chest, proves equally as beneficial as the cloths against the chest, without the disagreeable features of wet applications to the cutaneous surface.

If further trial substantiates the above statistics, then the cure of consumption in a great measure is solved. Anyway, the results so far reported justifies sanguine expectations; and from personal experience I can heartily endorse the electrostatis current and static cataphoresis in the treatment of consumption.

EPITOMES.

PROFESSOR THOMSON ON "ELECTRICITY."

In the interesting articles now appearing in the Sunday "Sun," treating of the progress of the past century, Professor Elihu Thomson, in his article on "Electricity," thus disposes of "Electro-therapeutics": "There is no space here to deal with the development of the use of electricity in the employment of the physiological powers of the electrical current which have given rise to the science of electro-therapeutics. It is probably true that electricity is finally to be one of the most potent agencies in the treatment of disease and in the alleviation of human suffering, but, unfortunately, the name Electricity is often made use of by the quack and charlatan to put forward wares in the form of electric belts, electric insoles, electric combs and what not, the effect of which is absolutely nil except in the imagination of the user.

"There are also devices which do in fact produce slight electrical effects which are paraded as panaceas for serious ills when, in reality, their electrical effect amounts to nothing and their therapeutic value is less than nothing."

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THE USE OF COPPER FOR ELECTRODES.

BY RICHARD J. COWEN, L. R. C. P. IREL., ETC.

I notice that in the last edition of Dr. Lewis Jones' work on "Medical" Electricity, as in most of the text-books on the subject previously published, the electrodes to be employed in giving various kinds of electric baths are recommended to be made of copper. Now electrodes made of this metal rapidly discolor and corrode under the influence of the products of electrolytic decomposition of whatever fluid is used for the bath, and consequently are troublesome in use. I have been using for the last two years electrodes of thin sheet aluminium and find them practically untarnishable in the solutions usually employed, and in every way much more suitable. In the case of aluminium the terminals should be clamped on, as soldering the metal is difficult and unsatisfactory. Possibly the hint may be of use to those of your readers who use electric baths in their practice.

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X-RAY IN EYE INJURY.

William M. Sweet reports a case of a piece of glass in the ciliary body located by the Roentgen rays and its removal with forceps.

The injury occurred to an engineer from the explosion of a locomotive oil glass, a fragment penetrating the cornea in the lower outer quadrant near the sclera and passing through iris and periphery of lens.

When first seen, three months after the accident, the lens had been absorbed, but haziness of the vitreous prevented a view of the interior of the globe. Radiographs indicated that a body, casting a fainter shadow than is usual with metallic substances, was situated close to the ciliary body at its lower temporal portion. On October 6 an iridectomy was performed at the Jefferson Hospital through an incision at the lower outer corneo-scleral junction, and a pair of iris forceps passed to the spot indicated by the radiographs. After a number of attempts, a mass of exudate containing the piece of glass was drawn into the anterior chamber and removed. Warm saline solution was injected into the globe, to replace the vitreous lost. The glass was 5 mm. long, 3 mm. wide, and 1.5 mm. thick. Very little reaction followed the operation, the corneal wound healing on the third day and the man being discharged on the eighth day. The vitreous is still hazy, but the eye is quiet, with prospect of a serviceable ball and possibly some sight.—Atlanta Journal-Record.

BOOK REVIEW.

UROPOIETIC DISEASES. By Bukk G. Carleton, M. D. Published by Boericke & Runyon Co., New York.

The second edition of Dr. Carleton's monograph on the Medical and Surgical Diseases of the Kidney and Ureters has come to hand. The addition of the Diseases of the Bladder to the text suggested a change of title to " Uropoietic Diseases." The subject is exhaustively treated and the various lesions and conditions clearly pictured, the ætiology, clinical history, and treatment, surgical and medicinal, being up to date and well described. The chapters on therapeutics, with indications for remedies distinctly outlined, are especially to be commended as of much value to the general practitioner.

JOURNAL OF ELECTRO-THERAPEUTICS

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PRESENT STATUS OF THE ELECTRICAL TREATMENT OF UTERINE FIBROMA.

BY WILLIAM HARVEY KING, M. D., NEW YORK.

In the year 1882 the late Dr. George Apostoli, following the initiative of Dr.Tripier, began his investigations of the electrical treatment of uterine fibroma, by establishing the clinic, which, while in after years it took in many other branches of gynecology and eventually became a general electro-therapeutic clinic, it was originally intended but for the one purpose. As late as 1886 but a very few of the physicians of this country knew of Apostoli's work, and the general profession was not aware of it until a year later, when it became very generally known through the writings of Dr. Woodham Webb, an English physician then residing at Paris, in the British Medical Journal. These writings were largely copied by the journals of this country. It was my good fortune to visit Dr. Apostoli's clinic during the year 1887, and for several weeks watch the treatments as administered at that time.

The following year we witnessed a period of literary deluge, which is so characteristic of the American people in riding a hobby to death. Hardly a journal appeared that did not have an article referring to Apostoli's treatment. These articles, had they been based upon experience, and had the writers relied upon facts for their statements and deductions therefrom, would have been of great service, but, unfortunately, not one in fifty was based upon experience, and not one in a hundred was based upon facts. They were a tissue of fabrications and of exalted claims from one end to the other. Had the advertising quack put forward such claims as were circulated through the medium of our medical journals of that year, the medical profession would have only sneered at them.

But of all the quacks the most diabolical quack is the ethical quack. He who stands surrounded by the wall of ethics, looking askance at the man who dares to advertise himself, but who practices a far more underhand and dishonorable method of advertisement by making extravagant claims through the columns of reputable medical journals, simply to catch the unsuspecting physician. For about one year this class of men had their day and their sway. The next two or three years witnessed one of those periods in medical literature where the discussions are more vituperative than scientific. Surgeons began to dispute the claims of electricity and call to account the writers on that subject for the grounds they had taken, and the claims they had put forth. The discussion degenerated from the logical sifting of facts to calling bad names and making uncomplimentary personal remarks. The failures were so numerous and so complete, and the entire treatment fell so far short of what was claimed for it, that the profession lost interest, and the pendulum swung so far the other way that it is possible it may never again become rightly adjusted so far as the medical profession is concerned.

The object of this paper is twofold: First, to try and rescue from oblivion a method of treatment which, when rightly administered, and when applied to the cases in which it is applicable, is of the greatest service; and, second, to bring out a discussion as to causes of failure and the cases in which the electrical treatment is indicated and those in which it is not.

As to the indications and contra-indications of the electrical treatment of fibroids, I believe that those cases in which the treatment will be most successful are not the very hard or very soft variety, but those of medium consistency. Those tumors which have a gelatinous feel, and are, to a degree, erectile, enlarging very much just before the menstrual flow, and decreasing rapidly during its continuance, will not be benefited, neither will the fibro-cystic variety be successfully treated. It is those tumors that have a moderate elasticity, not hard, nor soft, that are most reducible, and the symptoms of which are most amenable to treatment. There are certain pathological conditions which also contra-indicate the current in even this class of cases, and those are inflammations of the appendages. If there should be a slight ovaritis, weak currents of not over 15 ma. may be given to relieve the symptoms, but with no expectation of any reduction of the tumor. All suppurative diseases or chronic inflammation of the fallopian tubes, even a hydrosalpinx, contra-indicate treatment.

Regarding the location of the tumor. I believe that it is impossible to produce any marked reduction in size of a large sub-peritoneal or interstitial fibroid tumor, but that great reduction may be accomplished and still greater relief of symptoms in a submucous tumor.

I believe, though, that in nearly all cases the relief of symptoms is far greater than the reduction of the tumor. This may be accounted for on the theory that many of the symptoms are due to pressure; that a very slight reduction in size, so slight in fact that it is not noticeable to ordinary measurements, but which is enough to relieve the pressure. However, it is more probable that the electricity tones up the nerves of the pelvis, and thereby relieves the symptoms. Now as to the manner of treatment. The endometrical treatment and the punctured treatment were recommended by Apostoli. The internal puncture as originally practiced by Apostoli, and as used in this country, was very largely a farce. One surgeon in a combatative debate with an electro-therapeutist said that the internal puncture had degenerated into a scratch, and so superficial was it that this description gave a very accurate idea of it. The external treatment as practiced by myself and a few others, where the electrode, and a large one at that, was thrust through the abdominal wall into the tumor, gave opportunity for the exercise of electrolytic influence. The punctures, though, have about disappeared even among electro-therapeutists, and the internal treatment is alone left to us. There have undoubtedly been many failures in the treatment of even the class of cases I have mentioned as appropriate for the treatment, but I believe the causes may ofttimes be traced to certain defects in the application. I do not believe that the interpolar action has anything to do with the decrease of the tumor. It may, by stimulating certain nerves, relieve some symptoms, but with the most important symptom, hemorrhage, it has no action whatever. If this be true, the principal object we should strive for is to obtain as great a local action as possible around the internal electrode.

The active or intrauterine electrode should therefore be carefully selected. If the negative pole is used, and it should always be employed unless contraindicated by some cellular inflammation or hemorrhage, it may be made of copper, silver, or any suitable material. If the positive is employed, and which is indicated by a cellular inflammation or hemorrhage, in which case it should always be selected, it may be made of platinum, carbon, gold, iridium, or aluminum. I am aware that the action of the positive pole is slight upon aluminum, but it is so slight indeed, that it need not be taken into consideration, and with a little care it can be used with perfect safety, even with the strongest currents. In every case the electrode should be selected large enough so as to come in contact with both walls of the uterus. If the internal os is constructed so as to obstruct the free passage of the electrode, it should first be dilated. When the positive pole is used the treatment will be no use unless this precaution is taken, for it is the local action of the current around the positive pole upon the endometrium which causes the cicatricial contractions and relieves the hemorrhage. The reason why so many failures have been reported in relieving hemorrhage is due to the fact that the expensive platinum electrodes were not made large enough to fill the uterus. With the aluminum electrode we have such a cheap material that various sizes may be obtained, and we no longer have this to counteract the good effects.

Another cause of failure to obtain the local electrolytic action around the internal electrode is an uneveness of the surface of the interior walls. I had the privilege, some years ago, of attending an autopsy of a patient who had been treated by this method, and although the electrode used had been a large one it had touched, as shown by the destroyed tissue, on but three small points, the great mass of endometrium having entirely escaped. This may be overcome by not getting too quickly discouraged, and by gradually increasing the size of the electrode. A third cause of failure is the use of too weak currents.

Dr. Apostoli insisted that 25 ma. should be the amount sought. This was perhaps higher than need be, but anything less than 100 ma. will not do the work, and the nearer 150 one gets the better. I am aware that the objection will at once be raised that the patient cannot bear this amount of current. In the eighties we had but little trouble in getting them to bear the 250 ma., and if the same care is now taken they can be easily made to bear 150. That there are some that cannot bear this strength of current, I admit, but more often the fault is with the physician in not carefully working the patient up to the proper current strength, and neglecting to keep the external electrode in good condition. With these few suggestions I close, with the hope that they may bring out a full discussion.

RÉSUMÉ OF DISCUSSION.

Dr. Hills Cole: I have not done very much in the way of treatment of fibroids. One case I had, showed marked temporary benefit; but as the patient had to come out of town, and could only stay a very short time, the treatments were discontinued and the conditions returned. Others also showed no permanent relief, only temporary, while under treatment. There was a slight diminution of the size; but the tumor did not begin to disappear, quite a large growth was left. I am inclined to think the tumor was more sub-peritoneal than submucous.

Dr. Reading: It has been my good fortune to have seen treated a number of these cases. I do not think there is much to discuss in Dr. King's paper; his conclusions are those of all electro-therapeutists meeting with these cases. One thing I object to in the surgical view of the treatment of fibroid by electricity is the claim that it produces inflamed conditions and subsequent adhesions. I have seen a number of cases operated on after electrical treatment, and never saw any adhesions.

In treating these cases the electrode should be large enough to fill up the cavity of the uterus. The electrode should be placed high up and gradually withdrawn, treating a few minutes at each step. These tumors are not always reduced in size to any great extent, but you can cure the symptoms that produce the trouble. I have seen cases of the sub-peritoneal variety treated by puncture with decided reduction in size, but consider it too dangerous. I have seen several cases followed by peritonitis. The intra-mural variety can be relieved by electric treatment. After a certain time the treatment produces contraction of the muscular cells of the uterus, and it becomes sub-mucous and more amenable to treatment.

Dr. Geyser: I have treated a number of such cases during the last few years, but, as far as reduction of size is concerned, I have yet to see the first case in which it occurred. Symptoms have yielded remarkably, and the patients have remained well for some time. I agree with the point taken about moving the electrode: I never allow an electrode to rest long in the same place. You cannot cover the entire surface of the uterus with an electrode. If it is small enough to go there, it is too small to cover the whole surface; and for that reason the moving is about the proper procedure.

Dr. W. H. King: I do not believe in the small electrodes we used when this treatment first came out. I do not think it advisable to use one less than an inch long. I am convinced that we get better results when we use as large an electrode as can be introduced into the cavity of the uterus than when a smaller electrode is used and moved around. We want to treat the whole of the endometrium of the body of the uterus and do not want to waste half our current in the cervical canal.

With regard to the danger in external puncture: I have performed it eight hundred times, and I have never had a temperature rise above one hundred degrees. The reaction has been very slight; the patient has not been laid up more than forty-eight hours. In one case of ovarian tumor an iron needle was used on the positive pole as an experiment, and the fluid in the tumor was turned into pus and had to be removed. Dr. Munde made a report as to the danger of this treatment. I looked up a number of his cases—five or six were fatal. These had been punctured with ordinary needles, no attempt having been made to insulate the needle from the tissues through which it passed before reaching the cavity. In one case I was told by an eyewitness at the autopsy that the operators had missed the tumor and punctured the stomach. Such as that should not be classed among those of external puncture.

In some cases you get no reduction in size, whereas in others they will reduce very much; but there are very few indeed. In most of them you do not get a reduction, and you get no more relief in the symptoms than you do by internal treatment.

THE X-RAY TREATMENT OF CANCER.

BY N. H. CHAMBERLAIN, M. D., OAKLAND, CAL.

The object of this paper is to report a few cases of cancer treated with the X-ray, and to make a few deductions therefrom, in the hopes that others may be influenced to continue the experiments and assist in robbing one of the most dreaded diseases of some of its horrors.

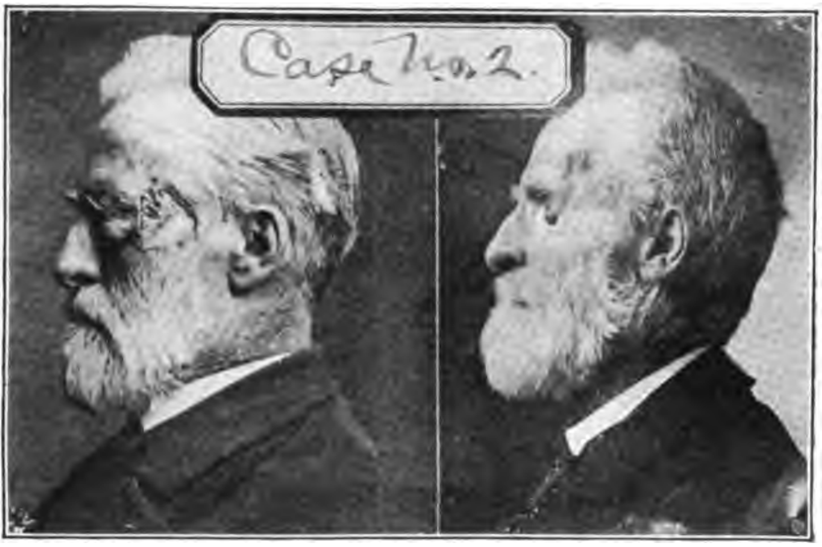
The following cases were treated with the ray generated in a Monell tube connected with a 10-plate Wimshurst Static Machine. Tubes of varying vacuum were used, from one so soft that the ray could barely penetrate the hand, to one so hard as to give a ray of the greatest penetrating power.

Most of the treatments, however, were given with the highest vacuum or so-called hard tubes. The distance of the tubes from the parts treated varied at times from three to ten inches, and the time of exposure from three to ten minutes. The best results were obtained with hard tubes at a distance of four to five inches, treating for six minutes at each exposure. The frequency of treatments varied from daily to twice a week, until some effect was noticed. This effect, in the case of an open sore or mucous surface, consisted in the appearance of an exudation, grayish in color, which, when stripped off, left a bleeding surface. In the cases of a skin surface this effect consisted in the appearance of a redness which is described as being from a dermatitis; in none of my cases, however, was this so-called dermatitis accompanied by any itching or burning sensation. The effect referred to did not appear before the eighth day following the first treatment, in some cases it was delayed for three weeks; the average, however, was about the tenth day. As soon as either exudation or redness appeared the treatments were reduced to three or four a week.

As far as possible the healthy tissue surrounding the growth was protected by lead rolled very thin, or four thickness of tinfoil such as is used by florists. When hypertrophic granulations were present they began to melt away about the time the exudate appeared, and a healthy healing line usually appeared within a month.

When hairy parts were exposed the hair fell out with one exception; but in all cases where sufficient time has elapsed, the hair has grown again. In cases of open secreting surfaces, the secretions were rapidly lessened; but in one case, where the deep cervical glands were septic, the formation of pus seemed augmented by the application of the ray, from which I argue that the ray is not germicidal.

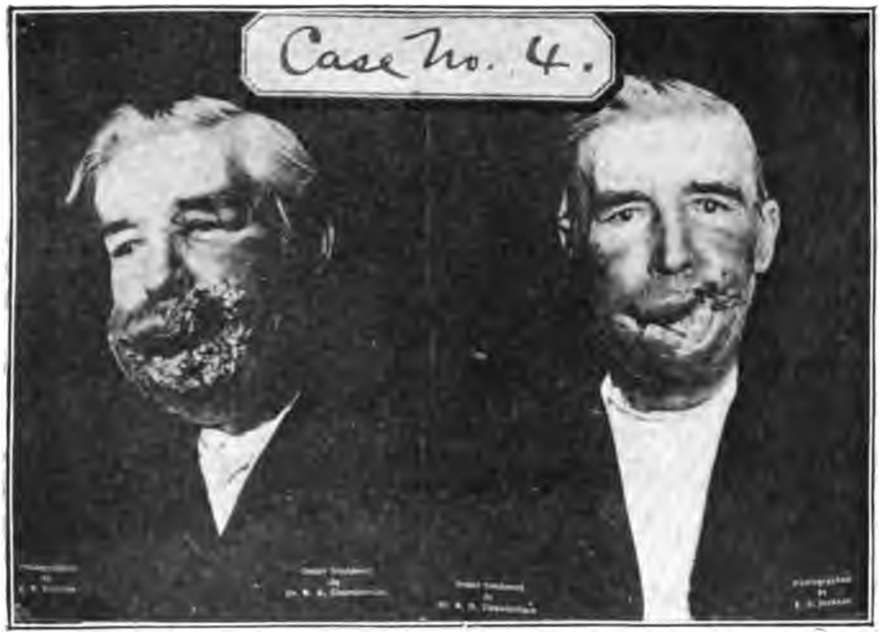
Case I.—A physician, seventy-five years old, who reported his own case. He had an epithelioma which began as a scale on the skin between the angle of the mouth and the wing of the nose on the right side. Finally there followed a deep open sore, which refused to heal and was removed by operation. A similar growth started at the wing of the left nostril, which increased, as did the first one, and was also removed. This one returned and was again removed. It returned again, however, and ate away almost half of the nose, including the cartilaginous portion of the vomer, a portion of the upper lip, a large hole in the left cheek, which extended to the malar bone and was very near the left eye. It invaded the mouth and ate away a portion of the gums on the left side, so that it was impossible to masticate solid food. The entire sore surface, including the inside of the nostril, was covered with easily bleeding fungous granulations. After about six weeks of treatment all pain and burning had ceased, and there was positive evidence of healing. In four months' time the doctor had gained about twenty pounds of flesh, was able to eat solid food again; and the sore was healed with the exception of a small space over the edge of the vomer and on the maxillary bone above the incisors. At these points the cicatrical tissue was so thin and the blood supply was so limited that the surface seemed ready to break down. Occasional mild treatments were continued for some weeks till this surface healed over. My last reports from the doctor, some four months later, were that he remained well, had resumed his practice, and had bought himself a static machine for the purpose of treating similar cases.



Case II.—A man of sixty-five years with an epithelioma on the left temple, and involving the left orbit, having destroyed the lower eyelid and eaten a hole into the nostril at the site of the inner canthus. This patient had submitted to several surgical operations and the application of numerous cancer plasters. I was compelled to remove the eyeball to save the other eye, in which sympathetic ophthalmia had begun. The accompanying photograph, marked Case II., shows this patient's condition as he came to me, and also his appearance after the sore was healed. The white patch on the side of his nose is a piece of cotton placed there to cover the hole in his nostril. The patient remains well to date also.

Case III.—A woman, æt. fifty-four, suffering from an inoperable cancer of the cervix. She had an offensive leucorrhœa, was anæmic from hemorrhages, which had been recurring for the last six months previous to her consulting me. She had passed the menopause one year before the first hemorrhage occurred. Her husband, a physician, was giving her morphine to relieve her pain. Ten-minute treatments were given daily through a Ferguson speculum. After eight treatments the characteristic exudate began to appear on the cervix, the offensive discharge was much decreased (though there had been no change in the local measures used), and she did not have any more hemorrhages from that time on. After the twelfth day she had treatments three times only per week, and of five minutes' duration, which was increased in a few days to seven and one-half minutes each. Her pain was very much relieved, and the abdominal distention disappeared. She unfortunately had the morphine habit, so that the opiate could not be withdrawn at once; but her husband was withdrawing it gradually. After two months and ten days' treatments had been given, and we were very much encouraged by so many favorable signs, our patient suddenly developed signs of cerebral embolism, from which she succumbed about two weeks later. She had no renal or cardiac lesion, and a question still remains whether the source of the embolism was in the uterus and from too rapid disintegration of the cancer caused by too vigorous treatment, or whether the hypodermic needle struck a vein.

Case IV.—A man, æt. sixty years, with a smoker's cancer of about four years' duration. The growth began on the left side of the lower lip. Six months after its first appearance he had it treated with plasters, without success. Two years ago, while it was being treated with electricity and salves, glandular involvement appeared under the right submaxilla. This patient's condition when he presented himself for treatment may be seen at a glance by referring to the accompanying photograph, marked Case IV., and the effect of the X-ray treatment on the case is also to be seen. All the mouth, as you see, except a small portion of the upper lip, right side, has been eaten away; there was almost universal involvement of the lymphatic glands of the neck, the inferior maxillary bone has been eaten in two at the chin, so that the two sides move independently. The glands of the throat were so indurated and enlarged as to threaten suffocation by pressure. The whole face was swollen; and hypertrophic granulations filled the wound and everted its edges. The treatment has entirely disposed of the hypertrophic granulations, removed the swelling from the face, relieved the dyspnœa, inverted the everted edges of the wound, has relieved the pain, and allowed the general condition to improve very much. Time only will tell whether the case will be cured, a result that I hardly yet dare to expect. However, if



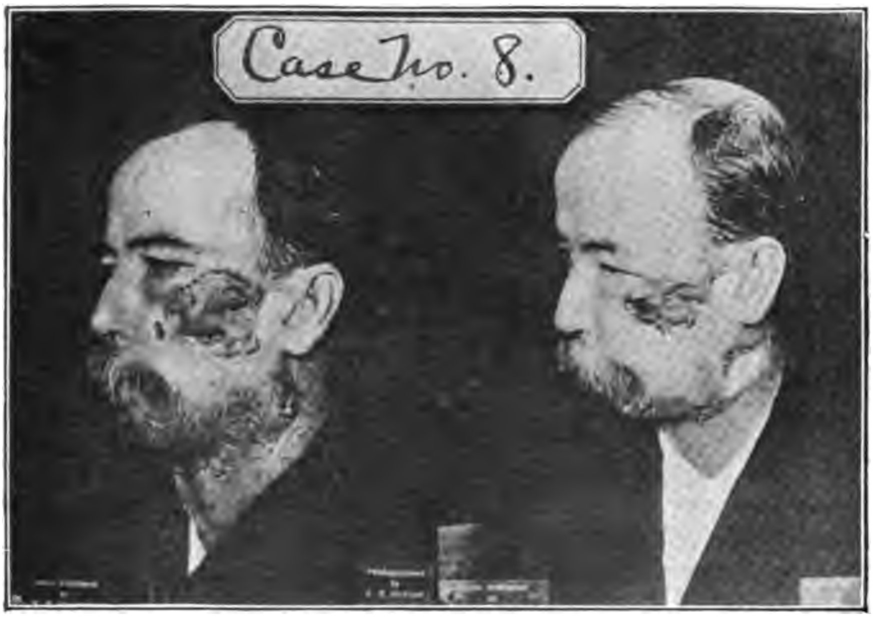
nothing more is accomplished than what is here demonstrated, the treatment cannot be said to be a failure. The case is still under treatment.

Case V.—A man, aged thirty-nine years, noticed a hard scale on his cheek six months ago, which he picked off. The scale soon reformed and grew so as to form a red papule with signs of breaking down in the center. The growth itched and burned almost continually. There may be a question as to the diagnosis of this case, but it seemed sufficiently clear to me to include in this report. Three treatments a week for six weeks resulted in the entire disappearance of the growth, and now, four months later, there is still no appearance of its return.

Case VI.—A woman, æt. thirty-two. Three and one-half years ago the crown of the wisdom tooth on the right side of the lower maxilla broke off, leaving a ragged edge. This tooth irritated the side and base of the tongue, finally resulting in an ulcer which has resisted every effort to heal, and has been repeatedly diagnosed as cancer of the tongue. There was a small glandular enlargement in the neck near the base of the tongue. One and one-half years ago the sore was thoroughly curetted, with temporary benefit. Afterward plasters were used. There was considerable pain. Twelve weeks' treatment gave considerable relief from the pain and reduced the size of the sore somewhat; but the patient became restless and quit the treatment.

Case VII.—A man, æt. fifty-seven years, having a smoker's cancer of two-years' duration, which had eaten away the entire lower lip and encroached rather close to the chin, with a secondary growth under the chin. This case showed evident signs of healing at first, but of late there is a tendency for the ulcerative process to extend along the inside of the cheek. All we have gained in this case is relief from pain and suppression of all tendency to form hypertrophic granulations. This case is still under treatment.

Case VIII.—A man, æt. forty-four years, whose photograph accompanies this report, being marked Case VIII., presented a large ulcerating growth on the left side of the face, three inches in diameter, also a large secondary glanular enlargement below the ear and a small one under the chin. The eye was much inflamed, and a small nodule with an ulcerating apex involved the lower eyelid. This cancer resulted from the kick of a horse four years ago; but its growth has been almost entirely during the last two years. A year ago an extensive operation was done in an effort to eradicate the disease, and this was followed by several secondary operations with the same object in view. All failed, however, and plasters were resorted to without success. When this patient presented himself he could not stand or walk alone, but was assisted by two people. His pulse averaged 130 beats per minute. He was extremely emaciated and suffered tortures from the painfulness of the disease, relying upon antikamnia and codein in large doses for relief. In spite of extreme cleanliness the sore was very offensive and was discharging freely. Now, after five-months' treatment, this man walks many blocks a day without assist-



ance, requires no opiate, is free from offensive odor, and the sore has healed to a marked degree, as shown in the accompanying photograph.

Case IX.—A man, æt. sixty-four years, had an epithelioma on the ala nasi of four-years' standing. The growth measured one inch in length and one-third of an inch in width, and was separated from the inside of the nostril by tissue hardly thicker than tissue paper. Two-months' treatment healed the sore, which I am sure remains healed, or the patient would have been back again.

Case X.—A man, æt. about fifty years, had several scabbed spots on his face, with the history of removal of the first one that appeared with the knife. This soon recurred, with others, and on second removal the specimen was examined with the microscope and pronounced epithelioma. I gave two ten-minute treatments to two of these spots, with an interval of a day, and let him go South to his business with directions to return in a month. He did not return till four months had passed, however, when I found the two spots treated were clean and healthy. I then treated the remaining spots in a similar manner, and have not heard from him since.

Case XI.—A man, æt. fifty-nine years, had an epithelioma of the lip which started about two years ago. It never amounted to much till a year ago, when he consulted a physician, who said it was cancer, and should be removed. He accordingly submitted to an operation. About a month later it reappeared, and he had it immediately removed, only to have it recur in about two weeks. He had it removed the third time, and it recurred in less than a week; so he refused to have any further operative work, but went to a cancer hospital, where chloride of zinc plasters were used. After some five-months' treatment in that institution the growth had progressed rapidly, so as to involve the right side of the lower jaw as far back as the angle, the inner side of the cheek, the cervical glands of the neck very extensively and almost as low as the clavicle, underneath the chin, and there was some glandular involvement on the other side. When presented to me he had been living some months on liquid food, and the septic condition of the cervical glands was so bad as to cause a daily rise of temperature to 101° or thereabouts. There was constant oozing of large quantities of pus from many sinuses; there was a large hole in the right cheek with everted edges, from which protruded a fungus mass of unhealthy granulation tissue. I should mention that the pulse in this case averaged about 110 per minute. Three-months' treatment resulted in the disappearance of the fungus granulations, reduction of the swelling of the face, relief of the pain, and some temporary increase of strength. The treatment seemed only to increase the formation of pus in the tissue, however, which interfered materially with the progress of the case. This patient finally succumbed to the prolonged suppuration.

Case XII.—A man, æt. thirty-nine, had his left testicle injured four years ago. The organ had pained him at times ever since. About a year ago he noticed it was growing larger quite rapidly. Last March the organ was removed and examined microscopically and pronounced to be a carcinoma. Four months later the patient had a recurrence of the pain, and examination revealed a nodule in the inguinal canal on the cord. This nodule seemed to be attached to the surrounding tissue, and was declared by the surgeon who had operated in the first place, and by two others in consultation, to be a recurrence of the cancer. The patient, being discouraged by the failure of the first operation, refused to have a second, and decided to try the X-ray. After six-weeks' treatments of three per week for six minutes, each at five inches distance, the nodule has entirely disappeared, as has also the pain. The surgeon above referred to examined the case after the treatments and concurred in the opinion just stated.

Case XIII.—A woman, æt. sixty-five years, was annoyed by a smale scale which appeared on her cheek in front of the left ear. This scale itched and burned so she scratched it off. It immediately returned, to be scratched off again. After repeated removal and recurrence it developed into a small nodule the size of a dime, with a disposition to ulcerate in the center; and the itching now amounted to pain. There was a small glandular enlargement below and in front of the ear. About a dozen treatments, given three per week, resulted in the entire disappearance of the nodule without scarring the surface, and there is no sign of return, though four months have passed since treatments were stopped.

I am opposed to two of the theories offered in explanation of the therapeutic and injurious effects of X-ray exposures. The first is electrolysis, which can be excluded on the ground that, in giving the static breeze, we often subject local parts to a much stronger induced current and for much longer periods without any such effects. The second is cauterization, which can also be excluded on the ground that the effects of cauterization are usually manifest immediately and always within three days of the application. The effect of the X-ray does not appear for from eight to ten days following exposure. There may sometimes be an exception to that when tubes of a very low vacuum are used upon a particularly sensitive patient.

Discussion of the modus operandi is not the object of this paper, however; so I pass to the following deductions from the cases reported, viz.: that the application of the X-ray is capable (1) of healing epithelioma of the face without deep glandular involvement; (2) in some cases at least, of relieving the pains of cancer; (3) of destroying the exuberant granulations of cancers which are the source of much offensive discharge as well as increased disfigurement; (4) of removing incipient epithelioma without production of scar; and (5) of accomplishing all these things without pain.

STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

BY WILLIAM BENHAM SNOW, M. D.,

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CHAPTER V.

THE CONVECTIVE FORMS OF ADMINISTRATION.

The forms of static application which are administered without direct metallic connection between the patient and machine (conductive discharges), or by spark discharges (disruptive discharges), are convective discharges. They are *static electrification, breeze, spray,* and *brush discharge.*

Static electrification, also known as the *static bath* and *static insulation,* usually administered in connection with a breeze or spray by placing the stand with point electrode near some portion of the body of the patient, is the simplest and least objectionable, and naturally the least potent, form of administration. (1) The point electrode when treating a case is connected with ground No. 2, as in giving sparks, and, if not to be interrupted, the chain or shepherd's crook may be held by the patient and otherwise placed upon the platform. (2) The other pole is grounded. The discharging rods are widely separated if treatment is to be constant, or placed at the desired distance apart if interrupted electrification is to be administered. In the event of using interrupted electrification take care, before starting the machine, that the metal plate, chain, or end of the shepherd's crook, one or all, are a few inches further from the feet or person of the patient than the length of spark-gap which is to be used; or that the patient is seated with his shoes removed, and feet upon the plate. Static electrification—interrupted electrification preferred, except in fidgety patients who are disturbed by the noise of the dis-

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charge (which may be much lessened by using a muffler)—is a less effective tonic form of application than the wave current or sparks, but in certain cases is to be preferred, either exclusive of other forms of treatment or accessory to breeze, spray, or sparks, local or general.

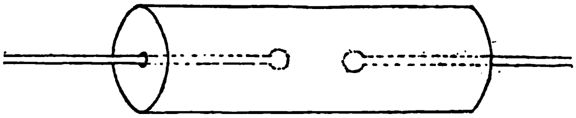

FIG. 5.

The breeze or soufle is a mild form of application and is employed as an accessory to static electrification, constant or interrupted, and the wave current. The stand electrode is called into requisition and may or may not be connected, according to indications, by the operating chain to ground No. 2. The point of the electrode—either bare or having the crown, or tassel, attached—is placed over the head of the patient, or the point alone near any other part to which it is desired to draw the bulk of the discharge. Another method is to connect the brush electrode with the operating chain, taking care that it is kept at the proper distance while moving it over and around the patient. Though not of special value therapeutically, the last maneuver often serves a good purpose when introducing a timid patient to static methods.

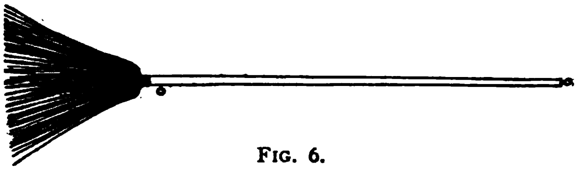

FIG. 6.

Another method of administering the breeze is by employing the static cage—the cage being suspended around the person of the patient and having direct connection with ground No. 2; at the same time the patient is seated or standing with the feet upon the metal plate. This form of treatment has also been administered combined with interrupted electrification, the spark-gap discharging at any desired length. In this event the patient must stand upon the plate with shoes removed, or the passage of sparks through the heels and soles will be intolerable. The objections to this method are (1) the suspense of the patient lest he get a spark, (2) some portions of the person of the patient will be nearer the metal of the cage than others, and from such surfaces the current will nearly all escape, and the treatment intended to be general will become local without reference to the lesion. (3) The apparatus is cumbersome and expensive, and at the same time not so effective in its constitutional effects as the wave current (see Wave-Current Constitutional Treatment) which it simulates.

The spray is a warm or hot breeze, differing from the breeze in arrangement only in the nearer proximity of the electrode to the person of the patient. To produce the strongest effect of the spray, there must be some non-conducting material, except over the hair, between the surface of the body and the electrode. A thick woolen or silk garment produces the strongest effect. It will be found convenient to have a square yard of good material for use when treating the hands or face, or to throw over damp clothes or fabrics not adapted to the spray or spark. For local use, the spray may be directed to the region affected employing the point electrode or an electrode having many points, and allowed to pass for five or ten minutes, when it has a rubifacient and anodyne effect. For general treatment, employ the brush electrode in the hands of the operator; passing it at the proper distances about the person of the patient, taking care not to discharge accidental sparks. Administered in this manner, it acts as a mild peripheral stimulant, and is agreeable to the patient, producing a favorable impression. Unless persisted in for a long time, however, it is not nearly so effective as the disagreeable friction sparks, which may be applied rapidly and effectively.

In the study and management of many cases there are few static maneuvers that cannot be found of special value, in selected cases.

The brush discharge resembles the spray and is so considered by many writers, but differs in so many essential features that it is deemed best for purposes of future reference, and to avoid confusion, to consider it under a distinct nomenclature. The writer considers it the most valuable of the forms of convective discharge and third in value of all the forms of administration.

The patient is connected to the negative pole of the machine by taking the shepherd's crook or chain in the hands or placing the feet, with shoes removed, upon the metal plate, which is in contact with the shepherd's crook. (An accidental spark administered with the rod in the patient's hands is a painful and most disagreeable occurrence, while to the feet it is not of so much importance if the shoes are removed.) The object of direct contact is the necessity of a strong passage to insure efficiency to overcome the resistance of the electrode, which should be of wood, preferably of soft maple, which may become so dry as to require moistening, or a glass vacuum tube of the proper degree of rarefaction. During an administration the positive pole of the machine is grounded to ground No. 1, and the electrode connected with the chain to ground No. 2. Or, during periods of humidity, employ the direct connection, as in administration of the direct spark. Administration may be made direct to the skin of the patient, or through the clothing or other intervening material not itself a good conductor. Wet clothing and certain fabrics which are not of insulation materials offer the same obstacle as in the use of the spark or spray. While administering the brush discharge, the machine must be running at the speed required for the administration of long percussion sparks—consequently, great care must be taken that the operator's hands, the chain, or the connection of chain and electrode do not come too near the person of the patient, lest a spark may pass, much to the annoyance of both physician and patient. It is one of the most annoying and common accidents in the course of static administrations, and may be avoided only by constant thought and attention while treating the patient. It is best to connect the electrode at the end of the handle, taking the chain in the hand with the handle, moving it up or down, as desired, to increase or diminish the intensity of the discharge. If an administration is prolonged, the handle will become sensibly hot, on account of the resistance due to the poor conductivity of the material.

The advantages of this form of application are as follows:

1. It is not disagreeable and may be administered to sensitive patients, and, though not as efficient as sparks in many cases, serves as a useful substitute until a timid patient will submit to them.

2. It is the best rubifacient form of treatment.

3. It is positively antiseptic, on account of the production of ozone at the surface of application.

4. It is better than the wave current for application to sprained or affected regions which are supplied with small muscles, as in the treatment of the hands or face, because the latter will cause painful muscular contractions if given with a long enough spark-gap to be effective. When it is desired to lessen hyperæmia, in the treatment of these cases, it must be continued for from ten to fifteen minutes to obtain the desired results.

5. The fact that it may be administered evenly to an affected surface, and is also rubifacient, makes it a most valuable accessory to all inflammatory cases demanding treatment by sparks.

6. As an application to the scalp, when patients object to sparks, and where the wave current cannot be employed, it surpasses the breeze or spray.

7. For application to surface affections, as superficial neuralgias, or diseases of the skin, it is invaluable.

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POLARITY AND ELECTROLYSIS.

BY WM. T. BRYAN, M. D., CINCINNATI.

One of the most important features in electrolysis is the knowledge of polarity and its uses. If the poles of your battery are not marked you can readily discover the positive and negative poles of a galvanic battery by connecting a steel cambric needle to each of the conducting cords, and, after turning on several cells, inserting both needles into a glass of slightly acidulated water (a few drops of sulphuric acid is generally convenient). In a few moments the needle on the positive pole will become oxidized and turn black, while bubbles of hydrogen will cluster thickly about the needle on the negative pole, and when withdrawn the positive needle will remain black and the negative will be bright as before testing.

This is why a solid gold, or a pure platinum, needle is a necessity in positive electro-puncture, for if a steel needle were used on the positive pole and introduced into the skin, a very dark disfiguring mark, caused by a deposit of oxide of iron, will remain and cannot be eradicated except by extirpation. For actual electrolysis it is desirable to have a battery capable of delivering the highest amount of amperage, with the least amount of voltage, in order to reduce to the minimum the current—pain. The fresher and more active the fluid and the more perfect the elements and connections, the larger will be the amperage delivered from the batttery. Amperage produces no pain. Voltage produces all the pain in all cases. Hence it is desirable to eliminate all resistance possible, in the circuit, so that a small voltage will force a large amperage over a small resistance, for voltage has no value except for delivering the amperage or current to the point where the current is desired to be used. To this end we use all possible means to eliminate resistance between the two poles. The skin at points of contact should be freed from oiliness by sponging with alcohol. Poles must be brought into close proximity.

If a sponge electrode be used on the indifferent pole, we would have it flat, very thin, and moistened with strong, warm salt water. What is much better than a sponge is a carbon disk electrode covered with absorbent cotton saturated with salt water, because the carbon will not corrode and thereby form an additional resistance to the current, as is the case with the metal disk under a sponge covering. Besides, the cotton may always be fresh and clean, for the carbon may be recovered with fresh cotton for each patient, as it requires only a moment to renew. It is inexpensive and offers far less resistance than a sponge. A pair of carbon disks will last a lifetime, and no sponges will ever be required nor desired when the carbons have once been tried. Also, when an uncovered carbon disk is applied to the skin, a strong escharotic action will be most rapidly obtained, and is useful for counter-irritation in cases of severe neuralgias, and in the relief of lumbago, etc., where, with three or four strong cells (making the active pole negative), the current will produce many small blisters when applied constantly for about five minutes. This is a form of electrolysis.

Another form of electrolysis, caused by the application of the bared carbon disk on the negative pole, is that immediately preceding the blistering stage, when the tissues and the capillaries underneath the point of application become weakened, and because of their weakness they dilate largely and allow a generous passage of blood to and from the part. This is a valuable feature of electrolysis, for it is often a great advantage to increase the blood supply to a part and thereby promote nutrition. It is a very easy matter to decide which to make the active pole, when we remember that the negative pole weakens the tissues and capillaries in the immediate vicinity of its application and the positive pole coagulates the blood and all the fluids of the body at the point of contact. The two effects are greatly augmented when the current is applied subcutaneously by electro-puncture (which is only an additional method of reducing external resistance).

Now as to baldness or rapid loss of hair, we have every evidence that it is mostly caused by insufficient blood supply (food to the hair follicle in the scalp), caused, it is thought, by too constant wearing of hats, especially hard hats, which cut off the blood supply. Evidences in support of this theory are: (1) it is hard to find a bald-headed woman; (2) it is hard to find a man bald below the hat brim; (3) it is hard to find a bald-headed white man whose scalp is not white and anæmic.

Treatment.—Where the hair follicle is not dead success by electrolysis is assured. Now, as we want to bring an ample blood supply to the starved follicle, we will take four or five good galvanic cells connected in series and attach the negative pole to a metal brush-electrode and pass it very slowly (patient must feel a smarting sensation) over the scalp for ten to fifteen minutes, or until a thorough redness has been produced. This redness may last two hours, or any number of hours, according to the amount of weakness produced in the capillaries. They should not be fully flushed with blood for more than two or three hours and repeated every day or two, for best results. Each application succeeding the last will require less time to produce the same effect, for the weakness already produced will not fully have passed away. The positive pole may be held in the patient's hand, or any point close to the active pole. The treatment simply furnishes ample nutrition to the unfed follicle, as does the fertilizer to a poor piece of land.

Metallic or carbon electrodes are always used where either positive or negative electrolysis is desired, and the poles should be brought into as close proximity as practicable to pass a current directly through a diseased part, or the nerves controlling the part. To eliminate unnecessary resistance is to spare the patient unnecessary pain. Remember that one cell will carry as much current when the poles are separated only one inch, as will one hundred cells when the poles are separated one hundred inches. One hundred cells, however, will carry one hundred times as much current through one inch as one cell will.

Don't forget that one cell produces just as much amperage on short circuit as will one hundred cells connected in series (i. e., when the positive cell of No. 1 is connected with the negative of cell No. 2, and 2 to 3, etc.). So it will be seen that it is advisable to have a battery cell of large amperage, for, while one volt will send one ampere through one Ohm of resistance, it can't do it unless the battery generates the ampere to send out. That is the unfortunate weakness of the "street current" battery. The physician receives the current in his office at 110 volts. This great pressure or intensity cannot be reduced by his apparatus—rheostat—and all he can do, and what he must do, is to reduce the amperage. Voltage does not leave the seat of generation—does not pass over the line of circuit—hence, the impossibility of changing it except at its origin. Now if with this heavy voltage the physician allowed any considerable amount of amperage to pass, it would, in nearly all cases, cause great and often irreparable damage, and, where applied to vital parts, would greatly endanger the life of the patient. These grave dangers are only obviated by reducing the amperage so low that it is of no value for electrolysis, and only used in nerve stimulation, for which purpose, however, it is excellent.

To destroy varicose or enlarged capillaries in the nose, hemorrhoids, and nævus, four cells, or as many more as the patient will tolerate (with full amperage), may be used with a gold or platinum needle on the positive pole. In electropuncture at the positive pole an acid is generated, which, as we have said, coagulates the blood and fluids of the body immediately contiguous to the needle. To eradicate an enlarged capillary, in the nose, for instance, pass the needle (positive) into and along the full length of the exposed part of the capillary, and in a few moments the blood will be coagulated; the needle may be withdrawn, and thereafter no blood can circulate in the vein. The coagulated blood will be gradually absorbed and then there will be no vein there, and the skin at that part will be as white as any other part. In hemorrhoids the action is the same, each tumor being punctured with the needle until coagulation has taken place, shutting off the circulation, and the tumor dies for lack of sustenance and is slowly absorbed.

The tumor is not disintegrated, as would be the case with the negative pole, and the puncture is closed by coagulation even as the needle is withdrawn, so that no germs from the passage of the fæces can enter to cause ulceration, as would be the case if the negative pole were used and the tumor broken down. In nævus the needle (positive) is passed entirely through the base of it just under the cuticle, or, if large, the needle is passed in, full length, allowed to remain a minute, withdrawn, and reintroduced one-sixteenth of an inch from, and parallel to, the last puncture, until it has entirely covered the whole base of the nævus. This shuts off the blood supply from the surface, and in a couple of weeks the dead cuticle will scale off and the skin beneath will be some whiter than neighboring parts, but in the course of two or three months it will gradually take on coloring pigment from the sun, and the surface will be uniform. While the positive pole is generally preferred in nævus, the work may be successfully performed by the negative.

In removing moles, warts, benign tumors, superfluous hairs, and other disfiguring and distressing growths by electrolysis, use platinum or gold needle on the negative pole, with just sufficient current to produce the desired results, usually four to six good strong cells of galvanism, or eight to ten of a feeble battery, which should be freshly charged for this specially heavy and important work. The current never heats the needle, as is erroneously supposed by some of the inexperienced, but the work of destruction is done by the chemical activity of the current. The indifferent pole is better to be made of carbon, covered with moistened absorbent cotton, pressed firmly against the skin near the seat of the active pole, although a sponge electrode will answer indifferently well. Introduce the needle full length, parallel with the surface of the skin, just at the deepest part of the base of the excrescence, allow it to rest there a minute or two or till a little blanching or froth appears about the needle's entrance; withdraw the needle and reintroduce it about one-sixteenth of an inch from the last puncture, so that the radiating action of the last puncture connects with the others, and so on until the entire base of the growth has been covered. Disinfect the needle in alcohol before and after using.

There is no question that perfect results will follow proper manipulation of the current.

SUPERFLUOUS HAIRS.

Superfluous hairs may be permanently removed by destroying the hair follicle by means of negative electrolysis. Seat the patient in an operating-chair, or other convenient position, with good light. Use four to six cells of a battery with high amperage. (A good battery cell not only develops large amperage, but also high voltage, so that the same efficiency is obtained with much fewer cells.) Six cells require much less time than four, but will cause more pain. The pain may, however, be reduced by first anæsthetizing the part locally by applying cocaine by means of a cataphoric electrode and galvanism. The positive pole should be firmly pressed to the skin close to the seat of operation, first cleansing the skin with alcohol, which decreases the resistance and lessens the pain. Attach a fine platinum or gold needle to the negative pole, and when all is ready the operator seizes the hair with a pair of tweezers and introduces the needle alongside the hair till the point just enters the hair follicle, usually about one-sixteenth of an inch deep. Soon a slight froth (hydrogen bubbles) will issue from about the needle, the hair becomes loose and is easily withdrawn. Use barely enough current to do the work expeditiously, and do not let the needle remain longer than it is necessary to produce sufficient chemical action to loosen the hair. The needle should not be introduced deeper than the follicle. The deeper the needle enters and the stronger and longer the current is applied, the greater the danger of cicatricial scar. Properly handled, no scar or pitting follows.

As electrolysis covers such an extensive field in electrotherapy and cannot be covered in the space usually allotted to a single article, I will now desist. I wish to add, however, that my extensive acquaintance with physicians leads me to believe that many of them construe the term "electrolysis" to mean only actual electrolysis, or disintegration of tissue; whereas there are more stages of electrolysis before actual disintegration than there usually are steps in a winding stair before reaching the top landing. These minor electrolytic manifestations are of great value when pathological conditions amenable to them are encountered.

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ELECTRICAL TREATMENT OF UTERINE FIBROIDS.

Dr. G. C. Segur formulates the following conclusions, after detailing three selected cases to illustrate his experience with the above treatment, as follows: (1) Electricity, properly applied, may be considered a specific for the treatment of uterine fibroids. (2) A moderate dose, 40 to 50 milliamperes, applied for twenty or thirty minutes, relieves pain and influences a diminution in size. (3) There are no dangers to be feared from its use, if carefully conducted. (4) Puncture is not necessary in order to secure practical results. (5) No serious operation should be undertaken until after electricity has been tried.—Phil. Med. Jour.

ITEMS OF INTEREST.

—In his new work, "Therapeutic Electricity and Practical Muscle Testing," Dr. Hedley recommends, in testing muscles, to begin with the continuous current, and afterwards to use the interrupted; whereas the more usual custom, and as we consider the better, is to commence with the coil, and afterwards to verify by the cells.

—"Electrotherapy in Exophthalmic Goiter," A. Lamari, Gazetta Degli Osp., Milan. A severe case of exophthalmic goiter is described as clinically cured after forty applications of electricity to the vagus and cervical sympathetic.

—Mr. H. A. de Latour of Dunedin, New Zealand, thus describes his method of using the x-rays for the localization of foreign bodies imbedded in the tissues. He wraps the sensitive plate in opaque paper and places it in a wooden box, the lid of which is crossed on the inside by several brass wires and on the outside is marked with lines corresponding to the wires. The brass wires are reproduced in the radiograph and serve to locate the exact center. The box slides on a horizontal graduated steel scale attached to the base of the upright which carries the focus tube. When one radiograph has been taken the patient crosses over to the other side of the table, and another radiograph is taken with a fresh plate. Tracings of each are then taken on one sheet of paper, always preserving the center, so that double shadows of the foreign body are shown.

—W. A. Fraser, author of "Mooswa and Others," has just written for early publication in the Saturday Evening Post a short, stirring serial, entitled "The Outcasts."

The Outcasts are an old buffalo and a wolf-dog, and the greater part of the story is about the strange comradeship and striking adventures of these companions, and their pilgrimage, in company, to the distant plains of deep grass, of which the wolf-dog knew.

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THE NATURAL HISTORY OF FIBROIDS AND RECENT IMPROVEMENT IN THEIR TREATMENT.

BY T. GERALD GARRY, M. D., LIVERPOOL.

Stanmore Bishop claims that every woman with a uterine fibroid should immediately be handed over to a surgeon, as it is worse than useless (inasmuch as it complicates matters) to have recourse to medicines or any other form of treatment for the alleviation of symptoms.

A statement like this sent forth with the imprimatur of a man in Mr. Bishop's position should be protested against, and, to use his own words, what is protested against cannot be too plainly stated.

With the purely medicinal treatment of fibroids I have nothing to do at present, but I think it must be conceded by every physician of experience in the treatment of such cases that Dr. Shaw-Mackenzie is to be commended in bringing so prominently before the profession the good results derived from the systematic use of certain medicines. Stanmore Bishop says that the blood in the case of fibroids does not come from the tumor itself, but from the opposing endometrium, and, so much being generally admitted, it appears that in the treatment as recommended by Apostoli we have at once a sure, scientific, and accurate means of stopping hemorrhage, and, possibly as well, cutting short the blood supply to the tumor itself, and thus securing a cessation of growth and eventual contraction. In cases characterized by menorrhagia or metrorrhagia the positive pole is always employed internally, and the effects caused are exactly similar to a caustic acid; hydrochloric acid being produced in immediate proximity to the pole, due to the decomposition of the normal sodium chloride existing in the tissues. The result can be intensified by increasing the current, until, after some experience, one can gauge with accuracy the extent of caustic action produced.

Of course it may be asserted, as some do, that any acid will produce the same effect, but ordinary acids cannot be applied with the same precision to the diseased endometrium. With electricity the effects are localizable and mathematically dosable, but these are produced as well as very important interpolar effects, such as coagulation of the albuminoids, contraction of the blood vessels, and other results due to the migration of the ions. These effects are quite sufficient to cause cessation of hemorrhage and alleviation of pain, as I have frequently observed in cases where, owing to the tortuous nature of the uterine canal, it was impossible to introduce an electrode.

The late Dr. Keith used electricity in a scientific manner for the treatment of uterine fibroids, and he was not ashamed to admit that he would consider himself " guilty of a criminal act " did he resort to hysterectomy without first giving it a trial. He also said that it was not a question of surgery, it was a question of humanity; and as his mortality was only four per cent., it appears to me that the mortality-rate had little to do with such a decided expression of opinion, but that it was prompted rather by the after-history of the successful cases.

Perhaps Stanmore Bishop or some other operator would furnish us with the exact condition of, say, 50 cases six months after removal of the uterus for fibroids. I have seen a great many such cases, and they were certainly not benefited by the operation.

It has been asserted that if any time is wasted in "useless experiments" complications are likely to arise, and are likely injuriously to affect the success of hysterectomy at a later date. General statements are easily made, but what we require are specific instances where complications have arisen, or injurious effects of any sort in patients treated by the Apostoli method, or by medicines as recommended by Dr. Shaw-Mackenzie, or where the treatment has proved to be inimical to operation performed at a subsequent date. During the past eleven years I have treated over 60 patients with uterine fibroids, and have seen Apostoli treat about 150, and fully ninety per cent. of these cases have been symptomatically cured, and in not one single instance has any untoward result followed the use of the current. I can therefore characterize the statements made by Stanmore Bishop as only existing on the "baseless fabric of a vision."

STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

BY WILLIAM BENHAM SNOW, M. D.,

Late Instructor in Electro-Therapeutics and Nervous Diseases in the New York Post-Graduate Medical School and Hospital.

CHAPTER VI.

CONDUCTIVE DISCHARGE.

Strictly speaking, all static discharges are currents, passing to and fro through the dielectric, or other media, as the chain or shepherd's crook, which may connect a patient or the platform with the machine. Such passages may be either insensible or associated with disruptive or convective dis-

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* Copyrighted.

charges, but are not technically classified as currents, as are conductive discharges.

The *spark-gap* is the distinctive feature of a conductive discharge from the standpoint of the electro-therapeutist, and was first defined by Morton when referring to the static-induced current: "A regulated interruption in the otherwise inoperative circuit of a Holtz machine would produce in another part of the circuit a current adapted to electro-therapeutic practice."

In other words, the spark-gap discharge is essential to the production of physiological effect upon a patient placed in the circuit. This is easily demonstrated by placing the two hands upon the two prime conductors of a static machine, previously charged, and then starting it at a rapid rate of speed—the passage of the electricity is absolutely inoperative and inappreciable.

Two spark-gap currents having various modifications have been published, and are now generally used and understood by well-informed electro-therapeutists throughout the world. Both bear the name of Morton, who introduced them to the profession—the *static induced current* in 1881, and the *wave current* in 1899. Physicists may criticise the nomenclature, but the names are distinctive and for all practical purposes equally as good as the terms constant and interrupted referred to the older currents of Galvani and Faraday.

The *static induced current* first published in the Medical Record of March 26, 1881, and later, more fully and explicitly, in the Medical Record of January 24, 1891, antedated even at the later date all therapeutic consideration of currents of great frequency and high potential. For ten years it had been almost unrecognized except by advanced workers and, during that period, was the only published current possessed of such qualities.

The current was known abroad as "the current of Morton." Later the apparatus of d'Arsonval (Fig. 7) was introduced, and the consideration of the currents of "great frequency and high potential" came rapidly to be a new force in electro-therapeutics. The apparatus of d'Arsonval was the result of an effort to produce, by transforming a street current, a current similar to the static induced current—a current safe of administration, of great frequency, and high potential. The static induced current is represented in the accompanying drawing (Fig 8).

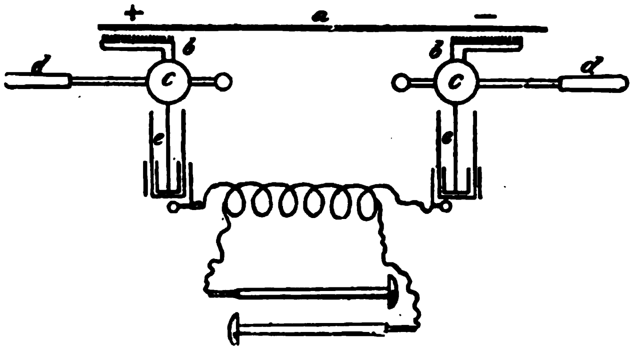

FIG. 7.—*a*, Revolving Plate; *b*, Collectors; *c*, Prime Conductors; *d*, Discharging Rods; *e*, Leyden Jars.

To operate the current, (1) place the two Leyden jars to be used in position, connecting the inner coating of the jars with the corresponding sides of the machine, (2) connect the rheophores with electrodes attached to binding posts provided on all static machines, (3) close the spark-gap of the ma-

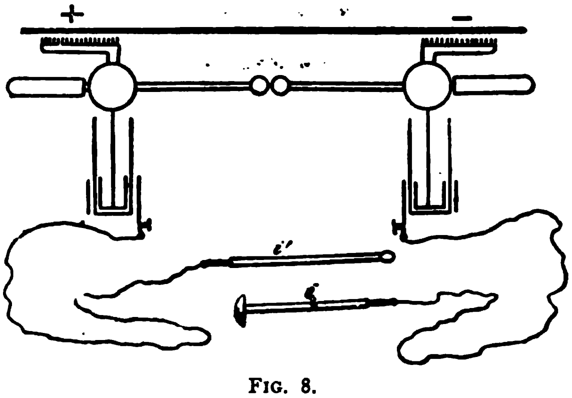

FIG. 8.

chine, (4) place the patient (not insulated) and electrodes in position, (5) start the machine at a slow rate of speed and gradually open the spark-gap to the desired extent. If no transformer is employed within the circuit, use the very small Leyden jars, or the administration will be painfully severe. It is necessary to call into requisition some method of changing the character of the current if Leyden jars of larger size are used, such as are attached to most of the later patterns of Töpler-Holtz machines which are on the market. For this purpose an enlargement of the modified Criado water rheostat, adopted by Dr. Margaret Cleaves, is useful (see Fig. 9).

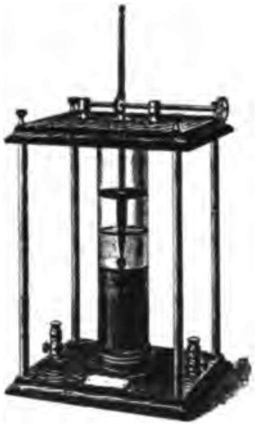

FIG. 9.

When placed within the circuit, employing the large jars or a long spark-gap, the current may be varied in amplitude or frequency and made most agreeable to the patient, without detracting from its other qualities. Various coils, employing either a primary alone or both a primary and secondary, will give shades of variation in the current, as with the various coils of Faradic apparatus, with the difference that in the first the source is of high potential, and the other of low potential.

By passing the static induced current first through a coarse primary coil over which is placed insulating material, and then wound with many turns of fine especially insulated wire,

—the Tesla transformer,—a current is induced of immense potential and very agreeable, either when administered as a current or applied as fine sparks from a vacuum tube or other electrode. This method of transforming the current was brought out by Professor Morton when experimenting with the Leyden jars in connection with X-ray work, and published in his work on that subject, and later described in his paper read before the American Electro-Therapeutic Association in September, 1900, as a "step-up" current (see Fig. 10).

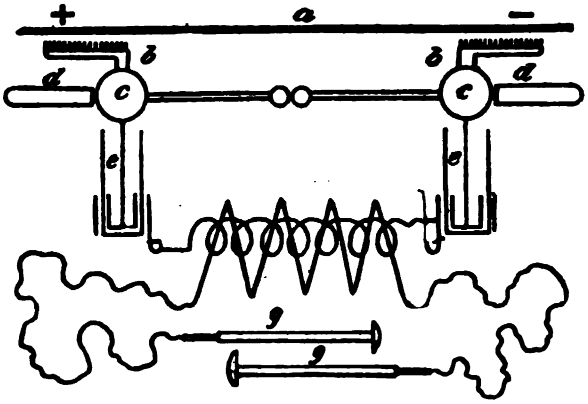

Fig. 10.—*a*, Revolving Plate; *b*, Collecting Combs; *c*, Prime Conductors; *d*, Discharging Rods; *e*, Leyden Jars; *g*, Electrode.

If currents passing between two poles are to be desired of ***great*** frequency, high potential, and small quantity, or of ***small*** frequency, high potential, and small quantity, there is no current with the aid of various Leyden jars and transformers more rich in the possibilities of variation than the static induced current.

Static currents are currents of ***high potential*** and ***small quantity,*** having the frequency of oscillation under the control of the operator. They are safer than the currents of the d'Arsonval apparatus and to be preferred, unless for some reason a greater amperage may be demonstrated of advantage. To us this very action, not a characteristic of currents of small quantity, is the objectionable feature of the d'Arsonval currents, and places them in the same category with medicines which are designed and do benefit to one condition, but require most careful watching lest greater mischief than good result.

The static induced current, except when the conditions of the quantity enter as a factor, is the most adaptable of all *two-pole currents.* The term *two-pole current* is employed in a relative sense, and is used in contradistinction to the *wave current* in which but one electrode is employed, the dielectric, the air, except when saturated with moisture, bearing away but a small part of the electricity.

A one-pole current, as the wave current will be considered, is the current of charge and discharge—an oscillating current in which there is but one connection from the source, the patient receiving a positive or negative charge at the discretion of the operator. *Two-pole currents* pass between the electrodes, the major part by channels of least resistance, varying in the extent of tissue electrified with the ratio according to the amount of potential utilized. *One-pole currents,* surging from electrode to surface, electrize the whole body of the patient.

Static electricity, when at rest, surrounds the surface of bodies said to be charged.

To reach such surface in its surgings it takes the shortest route, as do all displacement currents. It passes through the relatively homogeneous moist tissues of the body, and not over the dry skin, which is a poor conductor (the relative conductivity being about as one to one hundred). From the surface of contact with the electrode, electricity radiates in every direction to the surface of the patient, and back, with each charge and subsequent discharge. To the activities excited in cell protoplasm, both the mechanical, as of a breeze passing through the leaves of the trees, and the electrical, whatever they may be, are undoubtedly due the remarkable nutritional effect of the *one-pole current.* But there is another physical effect of a conductive discharge received upon a small area, without a means of exit by a continuance of the metallic circuit. It is as though a stream of water under high pressure had been suddenly thrown against a resisting surface. If a powerful stream is thrown against dry earth, how soon a depression appears and how soon the loam becomes saturated. So, if an electrical discharge of an immense potential is received upon a small resisting surface (the skin) of an insulated object (the body of the patient) placed in the path of the current, the impact at the surface of discharge will be marked, producing a local vibratory effect. The intensity of the effect will depend upon (1) the resistance of the skin, which diminishes as it becomes moist, (2) upon the size of the surface receiving the discharge, and (3) upon the potential of the current. So different, then, are the conditions and effects of currents having a receiving and discharging electrode, and those having but the receiving electrode, that there are reasons to expect different results. And different results are obtained, which are awakening new interest in electro-therapeutics.

The wave current (quoting from the paper of Dr. Morton read before the American Electro-Therapeutic Association, September 23, 1900) "was first so termed because its circuit to be completed produced Hertzian waves emanating from the patient's person."

The current was first published in the Bulletin Officiel de la Société Française d'Electrothérapie of January, 1899, and later in the Electrical Engineer of March 4 of the same year, and by the writer, in the Medical Record of March 3, 1900, and in the Transactions of the American Electro-Therapeutic Association for 1900.

The connections to produce are given here (Fig. 11).

"A very important modification of this method is shown in the next illustration (Fig. 12).

"A metallic foot-plate, upon which the patient's bare feet rest, is connected by a rheophore to an extraneous and independent insulated capacity. I generally employ for this attachment a zinc plate, two feet by five feet in size, supported upon insulated tripod legs. Any other metallic electrode, in any other situation upon the patient's person, may be substituted for the metallic foot-plate." *

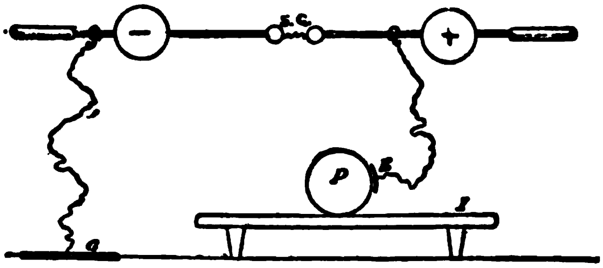

FIG. 11.—I, Insulated Platform ; P, Patient ; E, Electrode ; G, General Connection ; S G, Spark-Gap.

The Wave Current may be intensified and varied by employing an "external insulated capacity," as suggested above, and by making different connections employing a single Leyden jar, two electrodes, a device for a second spark-gap and a second ground connection.

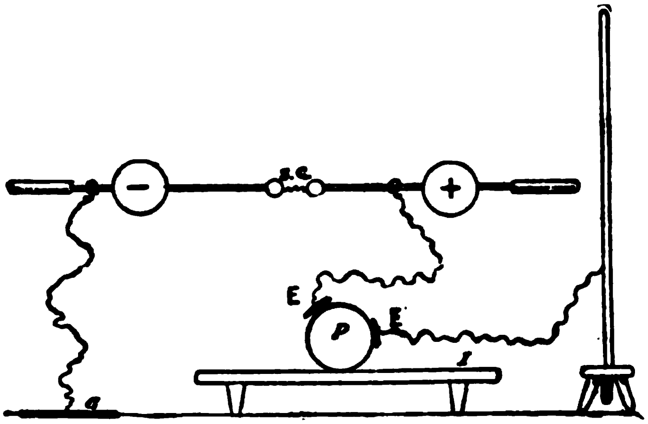

FIG. 12.—I, Insulated Platform ; P, Patient ; E, Electrode ; E¹, Second Electrode ; G, Ground Connection ; S G, Spark-Gap.

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* The above, including cuts, was taken, with Dr. Morton's consent, from the report of Transactions of the American Electro-Therapeutic Association for 1900.

I. When it is desired to intensify or localize the current by employing an "external insulated capacity" (see Fig. 13) it may be accomplished in the following ways: (1) A metal sheet is suspended upon an insulated stand or by insulation material, as a cord, from the point of the standard electrode, to which a rheophore passes from an electrode placed upon the patient, who has previously been connected by an electrode and rheophore to the machine by the usual method of administering the wave current. (2) By making use of a chair having glass castors or other insulation (as telegraph insulators) beneath the legs—the chair placed upon the insulated platform, the patient being seated on the chair with feet placed upon the metal plate which is placed upon the platform, the patient at the same time having the usual connections for application of the wave current. (3) Instead of the preceding a connection with either the inner or outer coating of a Leyden jar placed upon a table or the machine may be substituted.

II. A current of remarkable potency may be produced by modifying the wave current, as follows (see Fig. 14: The usual connections having been made, and the electrode placed upon a surface requiring an intense local application, place a second electrode or plate upon an indifferent part of the body or a part requiring a milder local treatment, and connect the latter electrode or plate with the inner coating of the Leyden jar, the outer coating of which is connected by direct metallic connection with the earth. A second spark-gap, placed in such a manner as to interrupt the connection between the outer coating of the Leyden jar and the earth, will vary the character of the current. The spark-gap between the balls of the discharging rods will, however, be employed to control the current strength, and the other spark-gap will be relatively of little value.

III. Another current very similar in character and effect to the static induced current may be produced with one Leyden jar, as follows (see Fig. 15): The discharging rods being widely separated, and one pole of the machine grounded, the other side is connected both with the patient and the inner coating of a Leyden jar. Another electrode placed upon the

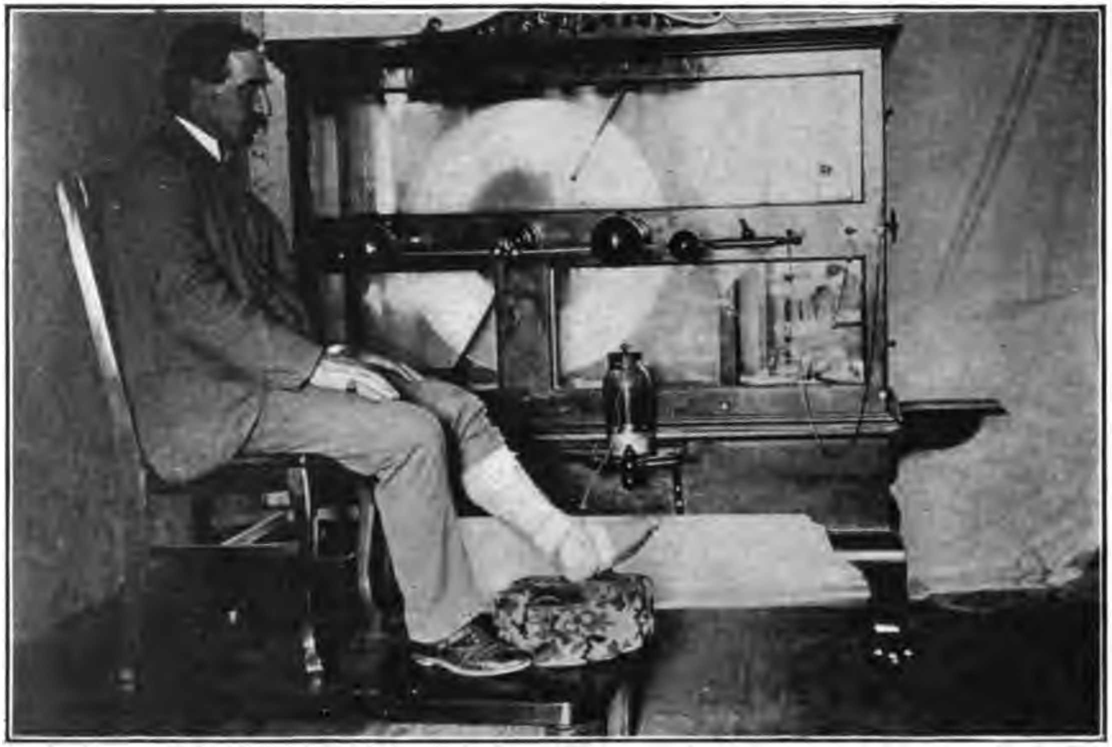

FIG. 13.—Showing patient having large abdominal electrode connected with outer coating of the Leyden jar and direct connection to an electrode placed upon the ankle.

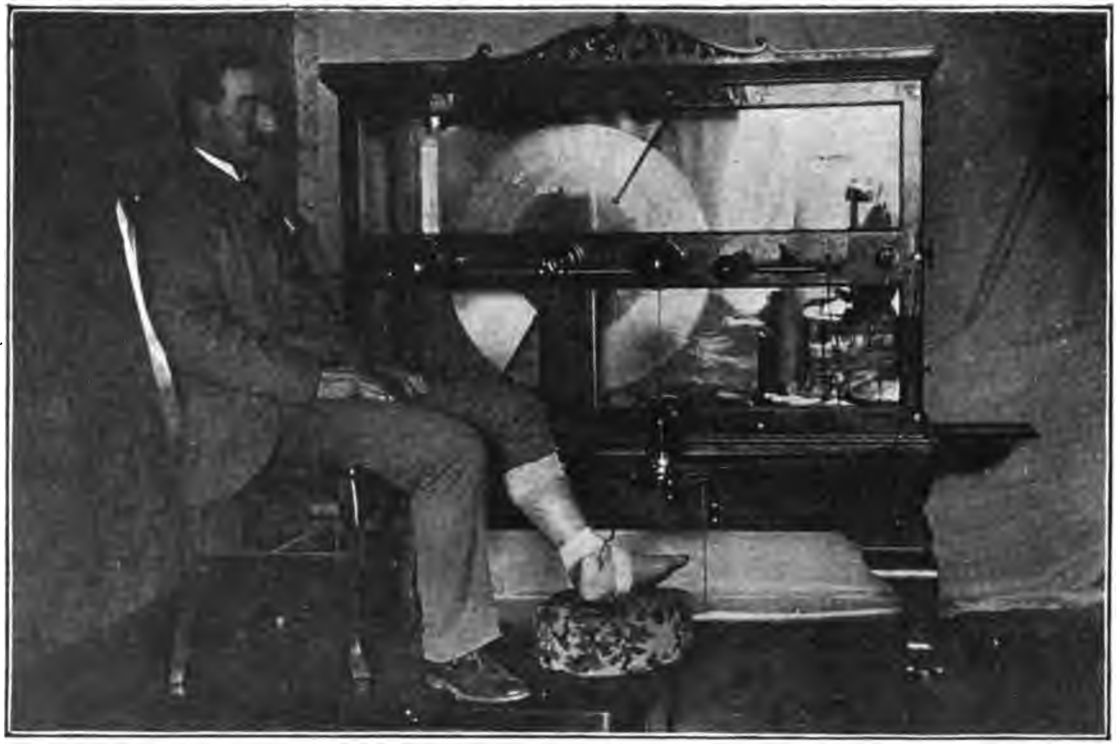

FIG. 14.—Showing patient with large electrode upon the abdomen, connected with inner coating of the small Leyden jar, having the outer coating grounded to ground No. 2, and a second connection direct from the machine to the electrode upon the ankle.

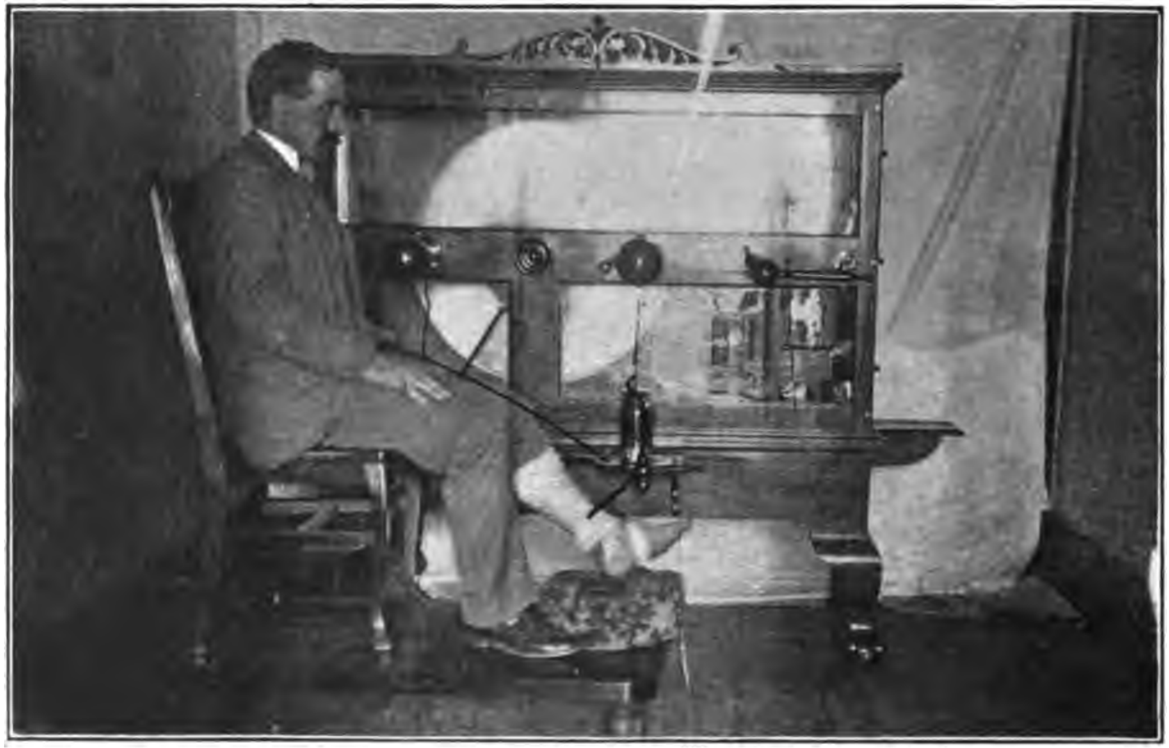

FIG. 15.—Showing the patient having connection from an abdominal electrode to the outer coating of the Leyden jar, and connection from the inner coating, which is also connected with one side of the machine ; the spark-gap between small ball connected with the outer coating and another connected with the earth.

patient is connected with the outer coating of the same Leyden jar, and by a device so arranged as to give a regulated spark discharge between the outer coating of the Leyden jar and a direct earth connection, a current of marked intensity is established, of about equal strength at the surface of each electrode.

In currents I. and II. the intensity of effect is greater on the side connected with the machine than on the side connected with the " external capacity," or the Leyden jar having a ground connection from the outer coating.

In these modified currents, the administration is made with the patient insulated, and the effect is local to a marked, and constitutional to a very moderate, degree. Whereas the unmodified wave current is constitutional in a very large measure, and has relatively less, but generally sufficient, local effect.

The intensity of the currents may be varied with the size of the " external capacity, the size of the Leyden jar, the size and proximity of the electrode, or the length of the spark-gap, and the speed and capacity of the machine.

The writer became familiar with the wave current during the summer of 1898, while in charge of the office and clinic of Dr. Morton, and was so favorably impressed with its nutritional effects that he later induced its more general adoption. It was afterwards used in very many cases and has since steadily grown in favor. During the following winter (1898-99) the writer in his private office discovered two remarkable properties of the current, which have now been verified in the practice of many physicians.

I. The *lessening* of *hyperæmia* and *congestion* and

II. The *relief of local pain.*

There are many important factors and accessories to be taken into consideration, if satisfactory results are to be obtained from administration of the wave current. We will, therefore, devote considerable space to details.

I. The *insulated platform* should be provided with glass legs (glass has been demonstrated to furnish the most perfect insulation) at least ten inches in length, and should be placed at a sufficient distance from the machine and surrounding objects to prevent the escape of electricity.

II. *The rheophore* should be always taut to prevent possible leakage, and may or may not be insulated with rubber tubing, which is desirable if the current is to be conducted for a considerable distance.

III. *The electrodes.*—There are many points to be taken into consideration concerning electrodes and their application.

1. The electrode must be in close contact with the surface treated. Intervening material—as clothing, a cord, a scab, or loose scales of epidermis—will cause an intolerable burning sensation, from the passage of innumerable short sparks to the surface. The dry skin requires, in a less legree, consideration. This is especially true of " the exposed portions of the neck," which may be moistened, or by starting the administration with a short spark-gap, and after a few minutes, as the skin becomes moist, separate the balls of the discharging rods to the distance indicated. It is well that all electrodes applied be either secured with bandages, the hand of the patient, or by placing a pillow where pressure will hold it in close apposition. We always place a pillow at the back when using the long spinal electrode, and also prefer having a chair with a high back, as it is often desirable to place an electrode upon the neck.

2. The size of the electrode is a matter of importance and will be governed by the capacity of the machine at the time of the administration, and the effect sought. During periods of humidity, or when, from neglect, the capacity of the machine is lowered, it will be found necessary to concentrate the energies of the current; the electrode used then must be relatively small. It is possible to make only general rules to govern the size of electrodes, which must depend upon the part treated, the patient, and the lesion. When applied to the muscles of the thigh, leg, or trunk of an adult, an electrode should not exceed twenty-four square inches in size for a spark-gap of four or five inches, and may often be advantageously used with the same spark-gap, when of not more than eight square inches. Muscular contraction or pain over an inflamed area will determine the relative size of the electrode to the spark-gap.

3. *Special electrodes* for treating the mucous surfaces of the open cavities are required; or various metal sounds, specula, etc., may be utilized in many cases. (These will be considered in chapters on special therapeutics.)

4. *The material of electrodes* must be of some good conducting substance, preferably of metal. Sheets of block tin of suitable thickness may be easily cut with a pair of scissors into any desired shape and molded to the surface, or lead will answer as well. We employ two thicknesses—22-gauge for the long spinal electrodes, because it has sufficient rigidity to permit it to be pushed beneath the clothing; and 32-gauge for application to uncovered surfaces. The thicker will often be preferred when considerable pressure is to be exerted over soft structures. Tinsel or tinsel braid, such as is used for trimming (preferably the cheap article used by stage costumers), serves an excellent purpose and may be applied as a bandage.

IV. *A good ground* to the pole not connected with the patient is imperative if any but the mildest effect is sought, as may be the case when treating the eye, ear, nose, or throat, when, if not connected with the ground chain, it may be made less severe and graduated without becoming too intense to be borne.

V. *The polarity* of the current has not been demonstrated to especially affect the results of administration, but it is noticeable that, under the same conditions and with the same length of spark-gap, there are about twice the number of oscillations from the positive side, the negative being grounded, than from the negative. The maximum spark-gap, when the negative is grounded, is also slightly longer than when the positive is grounded, other conditions being the same. The spark discharged is more clean cut, brighter, and the percuscussion sound more marked when the positive is grounded. These observations would seem to mark the negative current as the choice when local vibratory effects are indicated, and the positive for constitutional effects when frequency with greatest potential and amplitude of vibration are desired.

VI. *The length of the spark-gap* (the distance between the balls of the discharging rods) measures the resistance to be overcome by each discharge, and consequently the pressure, or electro-motive force, exerted upon the patient placed upon the insulated platform.

The possible maximum spark-length at the time of administration will depend upon (1) the capacity of the machine, which will depend upon its condition and the diameter of the revolving plates; (2) the condition of the atmosphere; (3) the speed of the machine; (4) the character of the insulation (see insulated platform); (5) the proximity of surrounding objects; (6) the physical characteristics and clothing of the patient (size and presence of many points, as hairs, allowing a greater escape of electricity to the dielectric).

VII. *The patient* before administration, if a lady, should remove her hat, and it is best always for patients who are taking electro-static treatment to use bone or rubber (not metal) hair pins, as the metal ones may cause disagreeable sensations and greatly annoy timid patients. Rubbers should also be removed before the machine is started. It is always well to advise patients to remove their watches, for, though rarely, they are certainly sometimes affected by the currents.

The patient should be placed in a comfortable position, if the treatment is to be long, and great care taken that the spark-gap is gradually opened after starting the machine at the beginning of the treatment; or, what is more important to observe, because it is more likely to occur, is that if for any reason, the machine is stopped during the administration and again started, or the speed accelerated, the passage of single or infrequent long sparks at the spark-gap does not occur, because they produce very unpleasant sensations of shock. Consult the patient's comfort always and employ no administration producing painful muscular contractions or severe pain, when treating inflammatory areas. If the noise of the discharging spark annoys the patient, which it rarely does, make use of the muffler.

VIII. The advantages of the derived currents consist in (1) their pronounced local effects, requiring as they do relatively small capacity in the machine, a short spark-gap, and slow speed, making them especially valuable to those having inferior machines; (2) to all during periods of humidity; (3) to those depending upon hand power for exciting their currents; (4) in all cases where very large areas require the application of powerful currents, and (5) when it is desirable to localize the effects between two electrodes. The effects are so similar in their local effects, especially with the two former, that the choice exists chiefly in the matter of convenience, which seems to be in favor of the second. Electrodes may be employed in connection with one or more joints requiring the same degree of effect connected in series, and the other large electrode placed upon the back or abdomen, or some part requiring a more or less potent effect, as the case may be; or the electrodes may be placed upon opposite sides of a region of the body requiring treatment (care being taken that they do not come in contact), for the purpose of localizing the effect within the intervening structures. Thus the very potent electrode connected directly with the machine, or the milder electrode connected with the Leyden jar, may be utilized according to the indications of the case.

Time will determine the relative value of the various static currents, but we believe that, except for the advantages indicated, the unmodified wave current described in the preceding chapter must be preferred; for its remarkable effects upon the general nutrition are due, not alone to intensity, but to the great amplitude and vigor of the administrations.

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NOTE ON THE TREATMENT OF EPIDERMOID CANCER BY THE ROENTGEN RAYS.

BY FRANCIS H. WILLIAMS, M. D., BOSTON.

Recently I have had the opportunity in this Journal of directing attention to the value of the X-rays in the treatment of lupus, and since that time further experience has confirmed my belief in it as a therapeutic agent in lupus vulgaris.

I desire also to state my conviction that the X-rays are of value in the treatment of certain forms of cancer. Their usefulness in relieving pain in cancerous growths was demonstrated in Germany some time since, and Drs. Wallace Johnson and Walter H. Merrill have written on the X-rays in the treatment of cancer. My experience differs from theirs in some respects, but before referring to it I will consider one or two points relating to face cancer. It is well known that this form of cancer may yield to treatment with caustics, and as they insist on the importance of causing a burn, it would seem quite possible that the good results they have obtained might have been due to the caustic action which they state it is essential to excite. They produce a mild inflammation, gradually increasing its severity till there is a burn of such depth that it would require six weeks to heal on a healthy skin.

My experience at the Boston City Hospital indicates that we have either in the X-rays themselves or in some other form of radiation from an excited Crookes' tube a valuable therapeutic agent in epithelioma, and that the beneficent action of the X-rays can be brought about without causing a burn. The patients to whom I chiefly refer entered the Boston City Hospital in the service of Dr. H. L. Burrell, who at my suggestion had a small piece of the growth taken out and submitted to Dr. Mallory; the latter reported that the growths were epidermoid carcinoma. Then Dr. Burrell most kindly had the patients transferred to my care. I have convinced myself that without causing any pain, and without the delay or inconvenience to the patient of an X-ray burn, we can accomplish excellent results with this new method of treatment. Foul and nearly unbearable odors cease, the discharge becomes less, and the growth steadily diminishes in size.

The earlier this treatment is undertaken the better. It is not improbable that we shall find its curative action limited to superficial growths, though, as a means of relieving the painful features of the disease in other forms, it may be of some use.

The delay in seeking medical advice for the treatment of a new growth in its earliest stages has been caused in many cases by the dread of the knife, but there is nothing to be feared in the use of the X-rays if they are properly applied; that is to say, if the apparatus, especially the Crookes' tube, is suitable, the distance of the patient and the duration of the exposure are properly chosen, and other necessary precautions are taken.

ELECTRICITY AND MASSAGE IN ATONY OF THE LARYNGEAL MUSCLES.

BY WM. R. KING, M. D., WASHINGTON, D. C.

In the past fifteen or eighteen years it has been my fortune to treat quite a number of vocalists, both amateur and professional, for various laryngeal ailments which have more or less seriously affected the singing voice, to its complete or partial detriment.

It is my purpose at this time to speak briefly of but one general class of laryngeal troubles, and that one I have found quite prevalent among singers of both sexes, but especially so in the female. This trouble consists of a species of atony or lack of power in the muscles controlling the vocal cords, and more especially of the adductor muscles thereof. In these cases there is a distinct inability to sustain continuous work of a vocal nature, or even, in many cases, to produce any true or perfect tone in some one of the registers. This I find to be most markedly noticeable in the lower and middle registers, and, in the case of women, most often in the middle alone. Where extreme effort is made to bring the vocal cords closely in apposition, as in the case in the upper register, the inability is less noticeable; or at least makes its appearance only later on. The causes of this condition seem to me to be several. First, incorrect use of the vocal organs and improper breathing whilst singing is a very common cause; and I find this to be the case especially among amateur singers. The teacher is much to blame for incorrect instruction, especially in the important matter of breathing properly when singing. The pupils of some teachers almost invariably suffer from this condition at some period of their career; and in some instances, after examining a patient's larynx and making a test of muscular power, I can call the name of the teacher, so prevalent is this trouble with his pupils. Again, singing more or less above the normal register, or quite loud or forcibly in an effort to make the voice carry in a large hall or other auditorium possessing inferior acoustic properties, is a frequent cause.

Protracted or continuous work of the vocal organs, as in the case of professional singers who appear before the public nightly in opera and rehearse for a change of bill daily. In some instances I have been obliged to advise temporary cancellation of a well-paying contract under such circumstances, doing so on pain of soon permanently losing all bread-winning quality in the voice in question.

There is, of course, no more reason why these muscles should fail to become exhausted and inco-ordinate in their action under the proper aggravating cause than that the extraneous eye muscles should do so; and thus produce not only the various reflexes we are all cognizant of, but even imperfect action, as an organ, of the eye itself. I have followed out various lines of treatment in the past, including rest more or less complete, instructions in breathing when using the voice, both in singing and speaking, for I do not infrequently find the same trouble to a greater or less extent in the case of public speakers, orators, and teachers, also using the various remedies of a tonic nature which seem especially indicated. I had been using electricity with considerable success as a tonic and stimulating agent for some time when a prominent vocal teacher, who is an educated physician, and who has with me been much interested in studying this rather prevalent condition, told me of the results obtained from digital or manual massage as applied by a professional masseuse. I had several of my more stubborn cases go to her for treatment of this sort, and, keeping them under surveillance, I found some apparent beneficial results in several cases; and, later on, while using and experimenting with pneumatic massage of the membrana tympani and the tensor tympani and stapedius muscles, and later on, with the use of the same agent in connection with electricity, upon the accessory muscles of the eye, the thought occurred to me that this method might prove a useful assistant. I had some small round cupping glasses made, of different sizes, with bell edges and nippled at the smaller end, over which nipples the rubber tubing from the pneumophone or pneumatic pump could be slipped. I have used the Houghton instrument made by Wappler & Co. of New York, as this appeared to me to be the best instrument of its kind yet devised.

I will briefly describe the entire treatment as ordinarily given at one sitting. After a diagnosis has been arrived at I begin by using a mild detergent followed by a slightly astringent spray, finding the soda solutions as a rule suitable for the former and a weak solution of tannic acid in dilute listerine for the latter; this is often followed by a spray of dilute glycerite of ammoniated tincture of guaiacum, especially if the vocal cords are congested, puffy, and the vibrating edges rough. Following this line of local treatment, I apply the interrupted galvanic current of about five milliamperes' strength directly to the outer surface of the larynx, usually applying the positive pole over the posterior cervical sympathetic ganglia and the negative over one side of the larynx, continuing this from three to five minutes at a sitting. I then change to the other side and proceed in the same way, following this in many cases with the faradic current directly across the laryngeal box. I have ceased applying electricity directly on the vocal cords in the larynx except in cases of complete, or nearly complete, paralysis of one or more of the laryngeal muscles. This for the same reason that I never apply medicine upon a brush or cotton directly in the larynx where the patient has any chance of regaining a useful or a profitable voice.

Following the use of the electricity as above described, I apply a pneumatic massage with the Houghton pump. I apply the bell glass cups directly over either side of the laryngeal box and turn on gradually a pretty active alternate suction and pressure motion, continuing this for from five to fifteen minutes, or until a general pinkish glow has been imparted to the skin. I neglected to say that, during the application of the electricity, and especially of the faradic current, I have the patient start with the lower register and take alternately a tone and its octave above, gradually elevating the tones until the upper register is reached. I also have them talk or hum or make some tones in the lower or middle register during the application of the pneumatic massage. This full method of treatment I have been following for about eight months, and have obtained some excellent results in restoring useful voices to those more or less bereft. So far I consider that from this combined treatment I get the best results. Of course, I often prescribe the apparently indicated remedy; but this part of the treatment does not interest us at this time. To be sure I do not follow out to the letter all the steps I have enumerated in each and every case, but vary and modify the treatment according to the apparent requirements.

I sincerely trust any member present will ask any questions that have occurred to him during the reading of this paper, and also that we may hear during the discussion the experience of anyone present along this or similar lines.

RÉSUMÉ OF DISCUSSION.

Dr. W. R. King: I do not know the winding of the faradic coil I use. I have had it a good while. It was made by Vetter. The point about the penetrability of a faradic current produced by a coil of fine wire is new to me. The theory on which I work may be wrong. I suppose I am toning up the muscles by making them exert themselves against the contractions caused by the electricity. In a similar manner I would develop a biceps by making it lift a dumb-bell. For some years I used massage alone. Now I am using electricity in this method in conjunction with it, and I find I am getting better and better results. When we have certain muscles worked out by continual use the first thing to do is to give them rest. Short periods of rest seem to be sufficient; but after a return to activity they are as bad as ever in a short time. One of the best tonics is electrical gymnastics. Take the biceps, adding weight to the dumb-bell makes the muscles use more effort, and that exercise develops the muscles. When muscles are in a thoroughly strained condition at the beginning of treatment I do not have the patient use the vocal exercise, but advise rest from speaking and singing.

Dr. W. H. King: In the method employed by Dr. King I do not think a record of the strength of current used means much. He increases the current until the patient produces the tone. He is evidently acting upon the nerves instead of the muscles. It seems to me that Dr. King would do better if he used the interrupted galvanic current and had the patient undertake to sing as he closes the current. It is marvelous what this method has done in other cases of atony and paralysis. Muscles treated in this way improve much faster than after contraction under electrical stimulation only. Faradism, being a rapidly interrupted current, holds the muscles in contraction; they do not relax. Under the interrupted galvanic current the muscles have time to relax. If the doctor would have the patient try to sing at the moment he applies the current, and then let up on the current immediately, he would get better results than in passing the current continuously through there and keeping it up. The muscles that are being acted upon by the faradic current are affected entirely through the nerves. The galvanic current would stimulate the muscles; but they are of such a nature that faradism can only reach them through the nerves. The penetrability of galvanism is greater than that of faradism. Thus we see peristalsis increase more with the galvanic current than with the faradic.

Dr. Geyser: It would be interesting to know what length of wire and of what degree of fineness Dr. W. R. King uses. Much will depend upon that. A short, coarse wire will not penetrate. It takes hold of the muscles and contracts them powerfully and this causes very great pain. A fine, long wire gives a current that is penetrating and painless. We do not all have the same battery; and if we could get the data as to the coil used we could repeat the doctor's treatment.

Dr. Hills Cole: I do not like the question brought down to coarse or fine wire. Such a statement is often made in books. We read that a current from a short, coarse wire stimulates, and that the current from a long, fine wire produces sedation. This seems to me liable to convey a wrong impression. It makes it seem that the different wire possessed different qualities, brought out by submitting them to the influence of an uninterrupted primary current. Such is not the case. The difference in the induced current is due, not to the thickness or fineness of the wire in use, but because more turns of a fine wire can be made on a given-sized spool than of a coarse wire. Consequently the electro-magnetic lines of force emanating from the primary coil are cut more often, and the resulting current is of a higher potential.

With regard to the subject treated in Dr. King's paper: I have had one or two interesting cases of singers who, in the course of their work, suddenly gave out and had to be put into condition to meet engagements. I have been able to give temporary benefit, sufficient to enable the singers to meet their engagements, by using the static-induced current on each side of the larynx, together with the inhalation of ozone generated by the static machine.

STATIC MACHINES.

BY G. ADOLPHUS PHILLIPS, M. D., CHICAGO.

When static machines are incapacitated by the humidity of the surrounding atmosphere, the simplest way to remedy the evil is the following:

Fill a one- or two-quart fruit jar with ice broken in small pieces and well mixed with rock salt (common salt will do). Screw air-tight lid on jar, set jar in saucer, and place in your machine closing case.

If humidity was cause of inaction, your machine will generate in from ten to thirty minutes, sometimes longer. If this fails, there is some other cause.

When ice is nearly melted remove the jar from the case, being careful not to let in much air from outside. It is necessary to remove the jar in order to prevent re-evaporation of the water.

The theory is this: The jar is cooled to freezing by the ice, thus condensing the residual moisture of the atmosphere within the case, leaving a dry atmosphere.

This has been published by others in pamphlet, also recommended by letter.

The writer claims to have originated the idea, but has heard of four parties since who also originated the same idea. One party says it is old. He has seen it years ago.

I venture to remark that the majority of practitioners have not heard of it, as it was unknown to some of the best men in Chicago prior to June, 1900.

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INCONTINENCE OF URINE.

Dr. J. Auriol Armitage writes: In answer to an enquirer's question with regard to incontinence of urine in a boy of eight years, I would suggest the use of the constant current of electricity. A large electrode applied to the lower dorsal region, which should preferably be the negative electrode, and a small positive electrode to the perineum—a current of about three milliamperes, used for about ten minutes on alternate days, will often give excellent results.

BOOK REVIEWS.

MEDICAL ELECTRICITY. A Practical Handbook for Students and Practitioners. By H. Lewis Jones, M. A., M. D., Fellow of the Royal College of Physicians; Medical Officer in Charge of the Electrical Department in St. Bartholomew's Hospital. Being the Third Edition of "Medical Electricity," by W. E. Steavenson, M. D., and H. Lewis Jones, M. D. With illustrations. Philadelphia: P. Blakiston's Son & Co., 1900.

This work, which is not unknown in this country, appears to us in an entirely new form. Many chapters have been added, notably on the utilization of the street mains for electro-therapeutical and x-ray work. Other chapters are entirely rewritten, and many of the subjects more fully described. The author acknowledges that he has drawn much from the French sources in regard to the high-potential and high-frequency currents. The book follows the general rule of works on electro-therapeutics, giving electro-physics, electro-physiology, electro-diagnosis, general electro-therapeutics, and special electro-therapeutics. Electrolysis is treated of quite extensively, although electro-gynecology occupies a very small part of the book. Nervous diseases are quite fully treated, and a very interesting chapter on the electric bath is added, which places that much-tabooed method of electrical administration on a scientific basis. Considerable space is given to the use of the x-ray in medicine. The book is certainly an excellent one. The revision is not only in name but in fact; it having been thoroughly brought up to date, and no one practicing electricity should be without it. There is much original matter in it which is to be found in no other book, at least one printed in English. There is also a chapter added on electrical illumination, but this is so condensed that it cannot be said to be of much use. The galvano-cautery also occupies considerable space.

RUDIMENTS OF MODERN MEDICAL ELECTRICITY. Arranged in the Form of Questions and Answers. Prepared Especially for Students of Medicine. By S. H. Monell, M. D., New York, Professor of Static Electricity in the International Correspondence Schools; Founder and Chief Instructor of the New York School of Special Electro-Therapeutics; etc., etc. New York: Edward R. Pelton, Publisher, No. 19 East 16th Street, 1900.

Dr. Monell, whose writings are so well known throughout this country, has here given us an exhibition of his wonderful power of concentration. He has by a set of questions and answers gone through the subject of electro-therapeutics in such a way that it brings the entire subject before the pupil in a very comprehensive manner. Of course the book necessarily must deal with the set rules of electro-therapeutics, as there is not much space for discussing the knotty problems; yet many of the complex problems are taken up in various parts of the book. It is in reality a quiz compend, but a very thorough one. We venture to assert that, if electro-therapeutics was taught in the various colleges, and examinations held on the subject, the same as in gynecology, nervous diseases, etc., this book would be in very great demand. The book is an excellent one for a beginner to learn the rudiments and principal rules which govern the subject of electro-therapeutics.

The value of medical and electrical treatment is fully recognized by Dr. Garrigues, in his recent book on Diseases of Women, and in his practice they are, whenever possible, accorded precedence over surgical measures. In support of his recommendation of electrical treatment the report of the special committee appointed by the American Gynecological Society is quoted, three out of four members being in favor of electricity as a therapeutic measure.

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THE ELECTRO-CAUTERY IN CHRONIC THROAT DISEASES.

BY ALFRED MIDGLEY CASH, M. D., C. M. EDIN., M. R. C. S.

In treating of the electro-cautery as a remedy against certain throat affections I must guard myself from being misunderstood. I do not wish to advocate the neglect of other methods, such as the many valuable medicines found in our pharmacopœia, the use of certain applications, as gargles, sprays, compresses, and inhalations, including the recent and useful aërizer, also the general hygiene and special care of the voice and throat. I have used them all with advantage, and shall hope so still to use them. But when we have done our best with all these means there remains a certain residue of patients still uncured and incurable, unless something that "will touch the spot" (like a certain much-belauded ointment) can be found to carry improvement perchance on to cure. That something I have often found in the electro-cautery, and believe that others who have not already done so may try it in their throat cases and find it, as I have, a potent and reliable weapon against these diseases.

Throat affections, possibly owing to a humid and variable climate, are legion in their number. They commonly initiate nasal and aural troubles, spreading by direct continuity. They are frequently inveterate in their character and prove obstinate to ordinary treatment. They are liable to relapses under many conditions, particularly so when the general health falls below par. Their presence keeps up a condition of permanent ailing and is a perpetual menace to anything like consistently robust health. They are associated with certain constitutional dyscrasiæ, as the rheumatic, gouty, tubercular, scrofulous, and syphilitic, and under these circumstances are apt to be specially rebellious to treatment.

Under medicine and general hygiene their progress is often disappointing. Relapses are the rule, and a condition, temporary in the first instance, very commonly recurs and tends to become chronic. Throat affections are particularly susceptible of improvement under favorable climatic conditions. Torquay being located in the southwest of the country, having a mild, sheltered position, screened from north and east winds over its chief area, and having a sunshine record almost unequaled and a variation of temperature of the narrowest, many throat invalids come naturally there for the advantages of the climate.

Of the various forms of pharyngitis one thus meets with and is most frequently called upon to treat, the following may be enumerated:

(1) Chronic parenchymatous hypertrophy of the tonsils.

(2) Chronic hypertrophic pharyngeal catarrh, or clergyman's throat.

(3) Chronic follicular tonsilitis; the tonsils secreting plugs and sometimes irregularly cleft.

(4) Varicosis of the tonsils and pharynx.

(5) Elongation and irritation of uvula sometimes œdematous in character.

(6) Plaques and lymphoid granules of pharynx, sometimes associated with post-nasal adenoids, sometimes existing alone, and more frequently as part of a condition of hypertrophic catarrh.

In addition to these I would name another class—one of general granular irritation of the fauces, possibly with little complaint of pain, but with a coexisting general constitutional debility, a sense of being almost always tired, and a weak, uncontrolled state of the vocal organs. As a matter of fact one seldom meets with these conditions singly. They may, of course, exist alone in any given case, but it is more usual to find several of them combined, as the same cause may affect the glands, the mucous membrane, or the veins, giving in this way, for example, a tonsilitis, a clergyman's sore throat, or a varicosis of the pharynx, which may all coexist in the same case.

CHRONIC ENLARGEMENT OF THE TONSILS

is, at the same time, one of the commonest and one of the most important of these local conditions. Met with mostly in strumous and tubercular-constitutioned children, it is very necessary, in treating the constitution, not to neglect measures for the local disease. While some have urged that only constitutional treatment is called for, and that when this is done the child may be left to " grow out " of the local manifestation, we must never allow ourselves to lose sight of the fact that these large tonsils, whose life history coincides with the period of the child's development, will, by their presence, inflict serious injury on the health and will retard the growth, mentally as well as physically, to an extent which can never be made up for afterwards. While we are waiting for the child to " grow out " of them they may cause deafness, retarded development in general bodily formation, deficient lung expansion, painful reflex neuroses, such as pain in the ears and gastric crises. Meanwhile their presence is a continual danger, as they offer a suitable area to which the micro-organisms of diphtheria and tubercle, etc., may be attracted and on which they may be cultivated. Energetic topical treatment is clearly required, and we shall best consult our patient's interest by combining this with such medicinal and hygienic measures as may be indicated for the general benefit of the health.

Such applications as sprays, gargles, and painting of the enlarged tonsils are all practically useless.

Cutting out the tonsils, as a rule, I must say I entirely object to, and have for years discontinued to practice. After this operation a partial result only is often attained. The tonsilar stump left is often uneven, irregular, or prominent in one part, and is still quite capable of giving trouble.

Then, while healing, it offers a raw, absorbing surface, particularly objectionable in a food passage, and affords a site upon which infective micro-organisms may develop—as, for instance, diphtheria has been known to do.

Again, the operation is painful and alarming to the patient; hence frequently requiring the use of an anæsthetic.

Thirdly, we have to face the possibility of hemorrhage. This statement has been combated, and bleeding after excision has been affirmed to be rare.

Unfortunately, however, it occurs, and probably we have all met with it. A case, but recently, has come to my knowledge where such was the severity of the hemorrhage, occurring some hours after the excision and when all danger was deemed satisfactorily over, that had not a medical man been most fortunately in the house that night, there is little doubt the child's life would have been lost.

Then we must remember, if severe hemorrhage occurs, the tonsil is a part difficult to get at. To tie a bleeding vessel here is impossible. It is a spongy gland, abundantly supplied with blood vessels. Five arteries from various large trunks terminate in its substance. We find such an authority as Treves stating, in his work on Surgery, that "the operation of removing the tonsils is often associated with free bleeding"; and other surgeons have recorded fatal results.

We cannot certainly know beforehand if any individual patient on whom we propose to operate may not have some one of these arterial branches of an unusual size distributed in the redundant parenchyma of the organ. Then, also, we are close to the large vessels of the neck. The internal carotid has been before now wounded in ablating the tonsils. Which of us would care to face the possibility of having, at a moment's notice, to tie the common carotid artery in the neck for hemorrhage, which might suddenly occur in so apparently simple an operation as cutting out a tonsil?

For the last fifteen or sixteen years, at least, I have employed the electro-cautery for the reduction of enlarged tonsils, and I do not remember a single case of the kind in which it has failed to give me a good result.

I admit it takes a little longer to do its work, as several applications are often needful; but, on the other hand, the patient is in a safe condition the whole time. Practiced as I shall describe it, the patient is entirely out of danger, both at the operative moment and afterwards while healing is in progress.

There is little or no pain attending on the application of the electro-cautery to the tonsils, for simple local anæsthesia is quite equal to removing entirely, or almost entirely, such momentary pain as would otherwise be felt. No raw, absorbing surface remains in the throat as a danger to the patient while the sore is healing. Hemorrhage is put out of court; such slight oozing as may occasionally be caused if the platinum cauter is too hot—not being worthy of the name; and even this need not occur if care be taken that the platinum is at a red—not a white—heat.

A better after-result is obtained than by cutting. No appearance of mutilation is visible in a throat whose tonsils have been carefully treated by the electro-cautery. They shrink up under its action into small innocuous bodies, incapable of mischief and affording little probability of recurring tonsilitis. The throat is thus permanently strengthened, and the whole system benefits thereby.

The modus operandi is as follows: The patient being placed, if possible, in a good direct light, or, if this is not possible, having a beam of reflected light thrown on to the fauces by the forehead-mirror, the tongue is gently depressed with a broad glass spatula, and a spray of five per cent. solution of beta-eucaine and hydrochlorate of cocaine, in equal parts, played upon the tonsils to be operated upon. If the patient is nervous, a second application may be made. In five minutes the parts are usually sufficiently anæsthetized. The tongue being held down out of danger by the glass spatula, a flat platinum cauter is passed over it, and, while cold, is pressed laterally upon the prominent projecting body of the gland. The connection is then made by pressing a knob on the handle with the forefinger. A fraction of a second secures a sufficient eschar being formed, and the cautery is withdrawn.

A dull red heat, not a white heat, should be used. The strength can be easily gauged by testing the battery beforehand. Usually there is no pain felt, or, at most, only a slight prick, which scarcely alarms the most sensitive patient. I find that children readily allow after-applications, as the first one usually gives them confidence.

A slight smoke and odor of incinerated tissue is observed when the connection is made. A thin slight slough forms at the seat of the burn, which takes about a week to be thrown off. Thereafter, other applications may be made, and, if time is an object—as when children are brought for treatment in the holidays—both tonsils, if enlarged, can be touched at the same time. If possible, however, I prefer to treat only one at once. Rapid shrinking of the gland follows these applications, and goes on for some time after one has ceased to make them.

Take a case where there are two large globose glands which will, on examination, be seen to roll inwards. Two or three touches of the cautery will set up in them such a shrinking that the condition of the throat is entirely changed. The tonsils may be burned on the flat, punctured by the pointed cautery, or barred in regular lines over their prominent surfaces, according to the judgment of the operator. Whichever process is adopted, the result is the same; the tonsil shrinks, flattens, and falls back to the side of the pharyngeal tunnel. No disturbance whatever is caused by the operation, and, except in rough or wintry weather, the patient may go about as usual, and need not alter his usual habits. I commonly order a calendula gargle to be used, and sometimes give a few doses of aconite or belladonna, according to circumstances. The following cases are fairly illustrative:

H. W., aged seven. Shortly after a not severe attack of whooping-cough, from which he had with treatment made a good recovery, the boy was observed to be generally failing all round. He had a succession of bad naso-pharyngeal catarrhs with deep, hoarse, croupy cough, becoming increasingly difficult to cure. He lost flesh and weight, and his parents became seriously alarmed about him. When they brought him to me, he was a pale, large-headed, puny-bodied little mite, with gastro-intestinal troubles which had created fears of mesenteric disease. I found on examination he had huge globose tonsils, pitted on the surface, which, on depressing his tongue, rolled upwards and inwards so as almost to meet and block up the throat. I began with him at once a course of the electro-cautery treatment, making the applications first to the right and then to the left tonsil.

Prominent parts of the tonsil were first burned on the flat as above described, with the oval flattened cauter, and as the hypertrophy was great and much follicular disease coexisted, I used also the method of ignipuncture at intervals—introducing the pointed platinum cauter both up the crypts and into the substance of the glands. Steady, uninterrupted shrinkage was set up. The globose tonsils fell away into small unprojecting bodies, and pari passu the health was restored. Six weeks later the child was entirely changed—a blooming, robust, active little fellow, not to be recognized for the small pallid creature he was on commencing treatment.

And I may say that this is five years ago, and since that time I have hardly required to treat him for this or any other ailment, his old frequently recurring catarrhs, which alarmed his mother by their croupy symptoms, having entirely disappeared.

L. R., aged ten, a tall, fair girl of nervous sensitive temperament, was brought to me; her tonsils had been large for some time, and for three or four months the throat had been sore. On examination the tonsils were seen to stretch back to the pharynx, forming large tumors, which rolled together when the tongue was depressed. She often gets bad colds, at which times she becomes deaf, and there is much sense of tickling and irritation in the throat. In the month of February she was put on electro-cautery treatment; the tonsils were touched with the platinum cauter chiefly by searing on the flat. First one and then the other was so treated. They gradually shrank back and fell away to the sides of the throat, which became much better and ceased to trouble her. Eight months afterwards she came to see me, and I find it noted in my case-book: " Throat is opened beautifully, tonsils small and flat and lie back in place. She has now a wide throat with smooth, healthy walls; since last seen she had never complained of the throat once, and has lost all tickling and irritation."

In the following winter she passed through an attack of whooping-cough, a severe ordeal for her type of constitution. However, the throat seemed to suffer but little, nothing in the nature of a relapse occurred, and one application of the cautery only was required the following spring.

This is three years ago; she has since developed into a fine, healthy girl of unusual physique and beauty.

J. D., aged fifteen, was brought to me with enormous hypertrophy of the tonsils. They were of the follicular type, with deeply marked crypts, and had been growing for years. He often has sore throat and bad colds, when he cannot sing and is sometimes deaf. The tonsils almost meet. He is a pale, tall lad, with distressed face and easily disturbed gastric functions. He has much irritation of the throat and severe cough, and phthisis, which is in his family, looks very like developing. I cocainized the tonsils and with the ball-cautery touched the left thoroughly in several places. There was much sensitiveness of the throat, with copious secretion of mucus. Next time I punctured the left tonsil freely and seared the right one more slightly on the flat. Again I punctured both tonsils in several places. In a month from the first the tonsils were greatly reduced in size and flattened back to the side of the throat. The patient was great benefited, losing many of his old symptoms. This boy was a very satisfactory case; he was a miserable specimen when the treatment was begun. He came of a family deeply tainted with phthisis, and he himself presented a well-developed pre-phthisical picture. The regeneration of his throat, which treatment effected, changed all this and was the turning point in his history.

I have had many such cases as these, some of them associated with post-nasal adenoids, but more often tonsilar hypertrophy alone.

In the former case special treatment for the adenoids may be necessary, but this does not come within the scope of this paper. In the majority of cases, however, the tonsils alone required treatment. In adults who have developed hypertrophy of the tonsils in later life, or who have continued to suffer from them since adolescence, electro-cautery treatment is also adequate for a cure.

In these cases the growths are apt to be firmer, having more of a fibroid consistence, containing a large amount of connective tissue. It is possibly owing to this circumstance that hemorrhage after amputation is more liable to occur than in children. It has been thought that the vessels on section retracted less readily and were more apt to remain patent. I have always treated such cases with good results with the electro-cautery, but find it more often necessary to puncture the tissue here and there. In doing this it is necessary that the platinum point should be at a dull-red heat. In one case I met with, where the tonsil grew out into the pharynx almost like a peg, I passed the loop over it and amputated it with the incandescent wire.

In chronic follicular tonsilitis, with secreting crypts, I have had good results by first expressing the cheesy nodules by means of a director, and then, under a good light, introducing the platinum point into the crypts and clefts of the gland. In this way the tonsil will shrink and concentrate, hollows are reduced in size and depth, and secretion lessened or definitely stopped.

HYPERTROPHIC PHARYNGITIS, OR CLERGYMAN'S SORE THROAT.

This is another common and highly important affection. Can we cure it? Certainly we can; but we often fail to do so. The condition is rebellious, and all the more from the difficulty of securing sufficient rest for the voice in those who depend upon it for earning their livelihood. Here I have found the electro-cautery a most valuable means with which to combat this often inveterate condition. Why clergyman's throat, the special feature of which, as its name implies, is weakness or failure of the voice, should be benefited by cauterizing the pharynx may seem at first problematical. The benefit, as Macbride puts it, may be owing to a powerful reflex, stimulating effect upon the larynx.

At any rate, in these pharyngeal cases, we find, coexisting with the laryngeal weakness, a condition of enlargement and inflammation of the lymphoid tissue in the mucous membrane of the throat.

In a good light we are able to see, in a pronounced case, longitudinal bands or plaques on the posterior wall of the pharynx, having the appearance of little patches of red velvet laid upon the surface of the mucous membrane.

We now carefully anæsthetize two or three of these patches, which we may do either by spraying the throat with a five per cent. mixed cocaine and eucaine solution, or still more completely by holding firmly a tampon of absorbent wool saturated in the solution against them by means of a pair of throat forceps for about a minute.

This will cause the plaques to lose their red, injected appearance for the time being. A conveniently shaped cauter to use is the stirrup shape, either rounded or flat. This should, as stated above, be first applied accurately to the patch to be treated, and then the current turned on. A firm touch or two will shrivel each patch, and if the patient is steady, two or three, according to the size, may be destroyed at one séance.

It is better to apply the cautery slightly, as it is not desirable to do more than simply incinerate the hypertrophied tissue. If, after the slough separates, we find some prominence remaining, we can easily give it another touch.

Only experience can enable us to decide and can give us the tactus eruditus to do enough and no more.

Deep burning of the throat is strongly to be deprecated. The slough separates in about a week, and for some time afterwards a shrinking of the surrounding redundant tissues occurs, so that if we do not see the patient again till some weeks later we are often able to observe that the throat is paler and less swelled, in fact, more benefited than it appears to be within a few days of the cauterizing. Until the sloughs have come away it is well not to re-apply the cautery, and during this time, while the throat is apt to be sore, a gargle of calendula should be used and the patient advised to avoid exposure to cold and the undue use of the voice.

Mr. A. B., aged forty-seven, first came to me about twelve years ago. He had a most severe condition of chronic hypertrophic pharyngitis with large velvety plaques, growing longitudinally on the mucous membrane of the fauces. The tonsils were deeply cleft and irregularly fissured in all directions, with much secretion of offensive plugs. In addition to all this there was serious coexisting nasal trouble, chronic nasal irritation, stenosis of nostrils with deflected septum and enlarged inferior turbinals. Suffering from almost constant catarrhs of the pharynx, his throat was, when he first came under treatment, in a condition which may fairly be called dreadful. One of his parents, a brother and sister, all died of consumption, and he looked very like going the same way.

He has now been under regular treatment for about ten years, medicinal and by the electro-cautery. With the latter the tonsils were smoothed down, pharyngeal plaques destroyed, inferior turbinals cleared back, and a breath-way opened through the nostrils. Catarrhs are now comparatively rare. He has developed into a strong, hearty man, with a constitution renovated. This is largely owing to improvement of local conditions, for which the electro-cautery is responsible.

Mr. C. F., in the artillery, home on furlough, came to me for treatment of the throat. The pharynx showed plaques of hypertrophied granular mucous membrane. He has chronic throat irritation with cough and hoarseness, which prevents him singing; has a red granular tonsil, much mucus secreted in the throat, especially at nights. I anæsthetized the throat with the eucaine spray and with the fine stirrup cauter destroyed five plaques on the posterior pharynx. Complete anæsthesia was established in four minutes and no pain was felt. Professional exigencies obliged his absence from home and interrupted treatment just as it had been begun. In seven weeks he returned. In the course of the next three weeks I several times touched the throat with the electric point. The irritable areas were thoroughly treated, and with the tonsils were smoothed down. The throat got clear and he began to feel it much less irritable, and the voice became stronger and clearer, of which he could judge well by his capacity for singing, of which he was very fond and which before commencing treatment had become almost impossible. His own report of himself was " infinitely better."

Irritation and weakness of voice and throat. Partial aphonia, chronic cough, abnormally long and trailing uvula, varicosis of the pharynx.

Mr. W., an instructor at the Dartmouth Naval College, has to talk continually many hours a day. Lectures have become extremely difficult from the cough and throat irritation when he uses his voice. Tortuous veins course over the right anterior pillar, he constantly hawks and spits with the sense of a lump in the throat. With the platinum point I destroyed the blue venous knots and burned back the long trailing uvula from the tip. His attendance was rather spasmodic, only coming irregularly, but he got much better, the voice gained power, and the violent paroxysms of cough were much reduced. When seen six months later his throat was remarkably improved. This gentleman was an inveterate smoker, as are so many of the throat cases amongst men, and the difficulty is to get them to abstain from the habit, which unquestionably keeps up the irritation and minimizes the success of treatment.

These will serve as types of this class of case; results are still better if the treatment is earlier begun. Some have disputed the power of an elongated uvula to cause cough and irritation. I have myself no doubt whatever of the fact. I have frequently seen irritable throat and often-recurring cough existing with, and kept up by, such a condition. Then after two or three applications of the electro-cautery to the tip of the uvula this will become rapidly shortened, when the cough will disappear and the throat lose its former irritability.

One such case I treated had succeeded to a severe attack of laryngeal catarrh, in a gouty elderly gentleman. The cough and spasm persisted, and on examination of the fauces I found a uvula quite abnormally large and baggy. This I reduced with the electro-cautery, applying the flat burner to the tip of the organ. In a week or two the uvula became much shorter, cicatrizing from its point and tightening up in its whole length. The throat, ceasing to feel the pendulous vibration against it, lost its irritability, and the rough, harsh cough shortly disappeared.

VARICOSIS.

The condition of varicosis and thrombosis of the pharynx is one which, I think, has been rather overlooked in some of our works on the throat.

It is very apt in certain constitutions to supervene on common recurring pharyngeal catarrhs, and is a source of much irritation and cough. It introduces catarrhs which run down into the larynx, causing weakness of the voice, with hoarseness and injury to all fine vocalization, and is particularly detrimental to singers and elocutionists. A vicious pathological circle is thus established which may be exceedingly difficult to remedy.

The pharynx is seen to have on its surface meandering veins giving a seaweed-like appearance, and sometimes dark venous knots of solid or partially solid thrombosis. As to treatment, little good can be done for this condition except by the electro-cautery, and happily this is sufficient for its cure. The effect of its application is striking and complete. A fine-pointed platinum cauter is used, the patient being seated in a good light, for accuracy and nicety are required for the operation; the tongue is held well down with the broad glass spatula, the pharynx having been previously anæsthetized. The posterior wall being by these means brought well into view, a platinum point, cold, is now placed on the vein to be operated on, and the connection made. Instantly the vein is incinerated and destroyed at this point.

A fraction of a second is enough; no more pressure should be used than just enough to destroy the vein, as it is not desirable to burn deeply into the tissues beyond. If there are several anastomosing veins, it is well to make the cauterization at several spots, so as to control the general venosity of the part. In a day or two afterwards, if the throat is examined, it will be found that the venous radicles have entirely or largely disappeared. In a few weeks the whole pharyngeal membrane will be markedly different, the general or patchy congestion having faded away.

The puffiness and angry redness or lividity also goes down, so that the whole of the throat assumes a more natural appearance. With this there is marked improvement in the general health. The cough is much lessened, and sometimes disappears almost at once. There is a sense of relief from the constant uneasy feeling in the throat, with its many accompanying sensations; there is an amelioration of the laryngeal distress, and the voice recovers its timbre and control.

This varicosis of the throat is frequent in gouty constitutions and in those who live well, leading indolent lives and addicted to the pleasures of the table.

It is connected with recurring gastric attacks and may be part of a chronic dyspepsia, needing attention to be directed to diet and general regimen. It is responsible at times for hemorrhages, which alarm the patient, creating fears of consumption.

Varicosis and thrombosis of the pharynx, pharyngolaryngitis—partial aphonia.

Mrs. S., aged thirty-five, has suffered from her throat for years and been for a long time under the care of a well-known specialist. Has a constant sense of a lump in the throat, thyroid cartilage tender, colds and coughs prevalent, and at times she coughs up a little blood. Fauces very red and inflamed, covered with wandering veins, here and there showing knots of thrombosis, mucous membrane angry, and feels sore and dry. After careful medical treatment for about three weeks she had made some progress, but, though less angry, the throat was still irritable, she continued to catch colds and get relapses in the throat. I therefore swabbed the pharynx with the eucaine solution, and with the electro-cautery point carefully destroyed two angry venous knots on the surface of the mucous membrane. At her next visit the throat was markedly improved, both in appearance and by her own sensations. It ceased to be an active element of evil, being in her own words "wonderfully better."

Varicose pharynx, coexisting in an invalid with dilated heart and chronic bronchitis.

She has a blue, congestive appearance with constant harsh cough lasting for hours, causing dangerous back pressure, and during the attacks she gets deeply cyanosed and exhausted. After failure of many remedies to relieve her I used the hot platinum point with which I touched and shriveled some large venous knots in her throat. She had no pain from the application; the cough was quieted. She felt great relief at once, and a much quieter night followed. On examining the throat four days later all the enlarged veins were seen to have disappeared. She expressed herself as "greatly relieved."

Here we have a large proportion of this useless, dangerous, and distressing cough rapidly dissipated as the effect of the galvano-cautery treatment.

This poor invalid had enough to bear from irremediable disease, without the infliction of such an evil as this, which could be dispensed with. She was eager for the cautery treatment and grateful for the relief it afforded her, a relief which could hardly be overestimated in such a condition.

Further illustrations might be adduced, and cases given of such forms of chronic pharyngitis as the general granular and that distinguished by lymphoid buds.

But this paper has extended, I fear, beyond the usual limits. Enough, I trust, has been said to testify to the position of the electro-cautery as a safe and efficient remedy in inveterate and otherwise incurable forms of chronic throat disease.

STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

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CHAPTER VII.

PHYSIOLOGICAL ACTIONS.

The literature of the actions of static electricity, except as derived from therapeutic applications to diseased conditions, is very meager indeed. In fact, so slight are the effects upon the normal individual that a study with such affords small chance to make the deductions necessary to form a basis for therapeutic indications. It is, therefore, necessary to observe the effects under the different conditions, and therefrom draw conclusions. The writer will treat the subject from the two standpoints. Franklinism has in it little, or we believe absolutely no, element of danger to be taken into account, and is, therefore, the choice of all electric forms of administration to be put in the hands of the novice, for he cannot do injury to the patient and, if fairly cautious, as he is bound to be, may do some good.

Many to-day consider the static modalities as but "suggestive therapeutic placeboes," which they are, in cases amenable to such influences, but their safety does not preclude the possibility of potency; as is demonstrated from exceptional results obtained in the treatment of conditions not so effectively relieved by any other measure, such as rheumatoid arthritis, sprains, and the forms of neuritis.

Compared with the constant (galvanic) current, the chemical action and transition of *ions* is insignificant, with the static modes of application. Electrolysis, cataphoresis, and cauterization—valuable measures as they are, where indicated—are practically impossible to obtain with Franklinism.

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Experience seems to have also taught that currents having relatively large amperage to voltage are neither so safe nor effective for either local or constitutional use as currents of high voltage and very small amperage.

Faradic interrupted currents are relatively impotent, and the currents of the apparatus of d'Arsonval, and other transformed street currents, have in them the element of danger due to amperage. The oscillatory, interrupted, and vibratory influences of currents of *small quantity, great frequency, and high potential,* which are administered to the patient while insulated and in a state of so-called charge, are peculiar to the Franklinic forms of administration, and the effects differ, from this fact. The effects upon metabolism of vibratory influences have long been recognized by physiologists, such as are attributed to the heart's impulse. Dubois-Reymond taught "that the nutritional effects depend not on the quantity of the electricity, but upon the variations in the quantity, and the suddenness of these variations," which is true, but calls for qualification in the matter of quantity and other features of administration.

We would qualify them by saying that the degree of nutritional effects of electricity depends upon the following conditions:

I. The current must be possessed of the maximum power of diffusion consistent with safety, which quality is peculiar to currents of large voltage and small quantity.

II. That its effect upon organic structures must be to induce functional activity, without a possibility of altering the natural characteristics of the organs.

III. That the suddenness of the variations, from a state of charge to one of discharge, must be instant, frequent, and rhythmical, and administered to the patient while insulated.

IV. That administrations shall be regulated in frequency, dosage, and duration to the demands of individual conditions.

We believe that it can be truly said that the only modalities that can produce such pronounced effects are those administered with the patient insulated. No form of application employing an electric circuit between two poles, labile or stabile, can produce the degree of constitutional effect of a high-potential current of charge having interruptions of alternating discharge.

There are two characteristic effects for consideration—the *local* and the *constitutional,* which vary with different forms of administration.

The local effects of the *wave* current are most valuable and, enumerated collectively, are: (1) local sense of vibration in structures beneath the electrode and of the hairs upon the head and surface of the body; (2) muscular contraction, most marked when an electrode is applied over a motor point; (3) physiological tetanus, induced by powerful currents or over sensitive regions, as of the hands or arms, increased by lengthening the spark-gap, or accelerating the speed of the machine; (4) secretion of sweat, always marked beneath the electrode.

In addition are valuable clinical effects: (1) local congestion is relieved, often with marked diminution of swelling and pain; (2) relief of local pain, or tenderness from many causes, is marked; (3) relaxation of acute muscular spasm, not of central origin; (4) increased local metabolism and repair if conditions are sluggish.

Sparks are in many conditions superior to the preceding, but in the aggregate cannot be considered as equal. The effects are: (1) a stinging sensation, accompanied by muscular contractions with the spark discharge; (2) at the point of discharge a blanched spot appears, due to contraction of capillary walls, which is followed, in a short time, by marked redness, which soon disappears, except in persons having weakened reaction; in these it may persist for twenty-four hours; (3) wheals, or even blisters, may be produced when sparks are administered successively; (4) sparks, like the wave current, increase local secretion and metabolic exchanges. Clinically, sparks also: (1) relax muscular spasm; (2) sedate pain; and (3) lessen hyperæmia and congestion. As a diaphoretic, and applied to muscular spasm and rigidity, as well as in its general massage effects, sparks excel very other modality.

The brush discharge, like the two preceding, though to a less degree, (1) increases secretion and activity of the end organs; (2) it is rubefacient and (3) antiseptic; and, clinically, (4) sedates pain, (5) lessens hyperæmia and congestion. The sensation produced is as if hot sand were thrown with considerable force against the parts.

The breeze and spray, which differ only in degree, produce a cool or warm sensation to the surface, varying with the proximity and the character of any material which may intervene. Non-conducting materials such as paper, woolen cloth, or silk increase the intensity of the convective discharges. The effects are the same as of the brush discharge, but less marked; varying with the proximity, etc.

The local effects of the static induced current are: (1) To produce muscular contraction or physiological tetanus; (2) to diminish local congestion and pain, in which it is much less effective than the other modes of administration. When, however, transformed by employing a Tesla coil, the applications with a connection from one pole,—employing as an electrode a modified Geissler's tube, or a glass electrode having an inner coating of metal, as suggested by Dr. Piffard,—produce an effect similar in many respects to the brush discharge: (1) Rubefacient; (2) antiseptic; (3) vesicant; (4) lessening local pain and congestion. Sparks administered with the ordinary ball electrode are relatively painless, and effective for superficial applications. These administrations may be made without insulating the patient.

Clinically, there are two results derived from the *local effects* of these high-potential electric modalities which cannot fail to awaken an interest in the subject from every special department of medicine. They are the effects upon *hyperæmia* and *congestion,* and upon *pain.* Hyperæmia, passive, as found present in surgical œdema, is relieved with remarkable promptness, leaving the parts, within a short period, in a healthy condition. Active hyperæmia and congestion can be demonstrated in so many instances to be relieved that it may truly be said that in cases of hyperæmia or congestion not characterized by bone necrosis or the presence of specific processes, such as induce syphilis, gonorrhea, or tuberculosis, or from a foreign body in the tissues, will be lessened, relieved, and cured when Franklinism is properly applied for a period of time, generally depending upon the chronicity of the affection. Contusions, sprains, synovitis, cellulitis, and the forms of neuritis afford excellent examples of its efficiency. The modalities effective in such conditions are the wave current, brush discharge, sparks, breeze, and spray, and are in degree efficient in the order named. The causes to which such effects may be attributed are: (1) The tonic local contraction of cell protoplasm, especially of the muscular structures; (2) increased activity of the processes of repair and elimination, and (3) a coexisting systemic lowering of arterial tension, which prevents prompt return of blood to the affected regions.

Pain is relieved to a remarkable degree by the applications of Franklinism. Those which are present under conditions of pressure due to congestion disappear coincidently with the latter. The pains of tabes, neuralgia, and migraine are so generally relieved by the various modalities, that the action appears almost as a specific, from most causes. Of all the forms of applications the wave current may be considered superior in most painful conditions, and the others in the same order of preference as in the treatment of hyperæmia and congestion.

The local effects of static electricity in relieving pain and congestion would alone place it in first rank as a therapeutic measure.

The constitutional effects observed, when static electricity is administered to an individual in health, are practically *nil*. To those, however, in which there is a departure from the standard of health, from either functional or organic derangement, the effects are most pronounced.

I. *The effects upon the circulatory apparatus* are: (1) general lowering of arterial tension; (2) lessening of the frequency of the heart's action, with (3) lengthening of diastole and (4) increased volume of the pulse.

II. *Respiration* (1) becomes less labored and less frequent; (2) deepens, and (3) there is found at the same time to be an increased elimination of CO_2.

III. There will be a general relaxation and lessened nervous irritability if the opposite conditions be present.

IV. Patients invariably become drowsy, and often fall asleep during the administrations, sparks excepted. Especially is this true of the wave current or interrupted insulation.

V. Prolonged administrations produce in some patients a feeling of lassitude not comparable to fatigue.

VI. A general diaphoresis is induced in most patients, if sittings are from ten to twenty minutes, with the wave current, interrupted insulation, or the convective discharges. No therapeutic measure, we believe, will induce a general diaphoresis so promptly and without depression as a thorough application of sparks, long and friction.

VII. Inactive secretions and excretions are more or less induced to activity during a course of either local or constitutional administrations. So remarkable are these effects that patients receiving prolonged treatment for a local trouble invariably show marked general resumption of functional activity to organs not impaired by organic derangement. Especially marked is the aggregate increased elimination of solids with the urine in rheumatic and gouty patients and those afflicted with rheumatoid arthritis.

VIII. There are reliable evidences of increased activity in the end organs of tissue metabolism, when a series of administrations are taken. (1) The increased oxidation evidenced by the marked additional elimination of CO_2; (2) the augmenting of the quantity of solids in the urine, with ultimate restoration of the proper proportions of normal constituents; (3) the restored appetite and steady increase in body-weight, until the patient's normal standard is reached, are the invariable results, if derangements are but functional.

IX. The constitutional effects of the "two-pole" static induced current are insignificant; in fact, the writer knows no indications to which the other modalities are better adapted than the powers of high-potential currents.

To summarize in a few words—*induced normal activity* defines the physiological effects of Franklinism, properly applied.

EPITOMES.

THE ACTION OF TESLA CURRENTS.

Loewy and Toby Cohn have repeated d'Arsonval's experiments with the very rapidly alternating currents of high potential (up to a million volts), which are called after Tesla, their discoverer. The oxygen absorbed, and the CO_2 expired were taken as the measure of the rapidity of metabolism. The subject was seated in a large solenoid or cage, and expired through a gasometer. The respiratory changes were determined in eight healthy men; first, under normal conditions; and, secondly, while subjected to the Tesla currents. The current was applied for ten to fifteen minutes before the air was collected for analysis, and was then continued to the end of the experiment. In only two of the eight was there an increase of metabolism above normal physiological limits, and in these the experiments were vitiated by accidental factors, which might have accounted for the metabolic rise. In two the metabolic processes were increased, but not beyond physiological limits; the rise was probably due to the psychical impression caused by the apparatus, since, when this was excluded as far as possible, no increase of metabolism was observed. In two others the currents had no effect on metabolism, although conjoined with the influence of psychical impressions. D'Arsonval's statement that the Tesla currents stimulate metabolism was therefore not confirmed. Cohn (ibid.) continued the experiments on 76 patients suffering from various functional neuroses and disorders of nutrition. The currents were in some cases applied to the patient seated within the solenoid, sometimes from a small solenoid directly to the part to be treated. The treatment was continued for a few days in some cases, and for three or four months in others. The current was applied every day or every other day. Suggestion was excluded as much as possible, since a hypnotic action appeared to be inexplicably frequent. Of the 76 patients treated, 4 were practically cured, 18 were improved, and 16 were unrelieved; the remainder did not persevere with the treatment. Thus, only 22 were really benefited, and the writer concludes that "Teslaisation," though it often relieves symptoms of functional origin, especially insomnia, does not effect any organic changes which can be detected by physical signs, and has no action on the blood pressure or metabolism, either in health or disease. Even when there is a subjective improvement in the patient, it is at present impossible to exclude all sources of error, such as the action of suggestion and of the ozone which is produced by the currents.—Berl. klin. Woch.

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LUPUS VULGARIS TREATED BY X-RAYS.

Everett Smith (Buffalo Med. Jour.) reports a case of lupus vulgaris of fifteen years' standing successfully treated and cured by exposure to X-rays. The patient was a man, aged about eighty years, who consulted the author on May 3, 1900, for an ulceration of the nose and face, involving his right eye. It was found that he had a lupus patch, which extended from the left side of the nose, going over the bridge, and involving the right side of the nose, the inner canthus of the right eye and the inner thirds of the lids, together with the bulbous conjunctiva. About fifteen years before he was slightly injured by a chip which struck him on the bridge of the nose, breaking the skin. It never healed over completely, but slowly increased in size, notwithstanding he had been treated by a score of physicians, a few skin specialists, and numerous quacks. About a year ago it involved the eye, and since then it had progressed more rapidly in the mucous surfaces. A mask was made for the face of sheet lead, a hole being cut for the nose and the diseased part of the eye, and with this on the patient was exposed about every fifth day for twenty minutes at a time, the diseased surface being placed about two inches from the light. He received in all twelve treatments. No medicine whatever was allowed. Marked improvement appeared after the second traetment, which was not interrupted until the sore was completely and entirely healed. After the second treatment healthy granulations appeared, and healing was most remarkably speedy. There was no burning from the light or any other unpleasant symptoms complained of except a slight headache and a decided "crawling sensation" in the sore from the first two treatments.

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THE CAUSE OF ROENTGEN-RAY DERMATITIS.

Kienböck (Wien. klin. Woch.) states that idiosyncrasy to the Roentgen rays does not exist, though some parts of the body, such as the mucous membranes and the skin over the face and back of the hands, are more susceptible than others.

To avoid unwished-for erythema or dermatitis it is necessary to know to what they are due. The view most generally accepted in Germany and Austria is that the skin is affected by the electrical discharges from the tube, or the "electrical field" surrounding it, and not by the Roentgen rays themselves. The more complete the vacuum in the tube, the greater is the required E. M. F. If the E. M. F. is insufficient to overcome the resistance of the tube, the current finds its way through the air outside the tube, and is not converted into Roentgen rays. If, with a highly evacuated ("hard") tube, the E. M. F. is sufficient to overcome to a certain extent the resistance, some of the electricity is converted into Roentgen rays, which have a great power of penetration, and therefore produce a skiagraph lacking in contrasts. In a good ("medium soft") tube the vacuum is not so complete as to prevent the current passing between the electrodes; almost all the electricity is converted into Roentgen rays, which give a skiagraph with well-marked contrasts, and very little passes round outside the tube. If the vacuum is not complete enough, on the other hand, the current passes too easily between the electrodes; it produces violet fluorescence, but no Roentgen rays. Those who believe that the skin is influenced by the electrical discharges and not by the X-rays use highly evacuated tubes in the treatment of hypertrichosis, lupus, or other skin diseases, and moderately evacuated tubes when they wish to avoid all effects of the rays on the skin. Those who, on the contrary, believe that the Roentgen rays are themselves the active agent employ exactly the opposite method. It is not surprising, therefore, that unexpected and unpleasant results follow. Another source of danger is that the degree of vacuum within a tube varies. A too highly evacuated tube after a few minutes' use becomes "softer" and emits more X-rays, but afterwards, while disused, becomes even "harder" than before. Some form of tube in which the degree of vacuum can be regulated at will should, therefore, always be preferred. Kienböck's experience, both clinical and experimental, proves that cutaneous changes always result from the Roentgen rays and not from electrical discharges. (1) Four patients were treated for hypertrichosis, sycosis, etc., with rays from a highly evacuated tube. The changes produced were inconsiderable, and, though temperary alopecia occurred in one, the hair was soon regenerated in spite of the treatment being continued. A tube with a self-regulating vacuum, which emitted rays which gave skiagraphs with sharply defined shadows—"medium soft" tube—was substituted. Simultaneously, a fifth and hitherto untreated patient was subjected to the action of the new apparatus. On the eleventh to the fifteenth day such redness and swelling—with in one case pigmentation and in another ulceration—of the skin set in that the treatment was abandoned. (2) Several rabbits were subjected to rays from a " hard " tube on one flank, and from a " soft " tube on the other. The " soft " tubes alone produced dermatitis and alopecia. (3) It can also be proved that the dermatitis is produced by rays, which, like the Roentgen rays, travel in straight lines in all directions from the focus of the tube. Thus the changes are less at the periphery where the rays strike the skin obliquely, and the circular patch of changed skin is larger the greater the distance from the focus. If the anticathode be placed at right angles to the skin of the forearm, so that Roentgen rays are emitted from only half the tube, dermatitis is produced in the skin opposite the rays, and not in that under the other half of the tube, although it is equally exposed to the electricity. Again, sharply defined figures of normal skin will appear within an area of inflammation if a leaden block be interposed between the focus and the skin. But the outlines would not be sharp if electrical discharges were the cause of the dermatitis, since these are given off, not from a focus, but from the whole surface of the tube and the wires connected with it. India-rubber gloves which completely protect the hands from electrical discharges are of no use in preventing dermatitis. As there is generally an incubation period which may extend to twenty-one days, it is wrong, when applying the rays for therapeutic purposes, to wait for the first signs of a reaction before discontinuing the treatment. After three to five applications of the rays from a " soft " tube on successive days a pause of two to three weeks should be made. Afterwards, when the effects of the treatment have passed off, or if no reaction is produced, the process may be repeated.

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TREATMENT OF CARCINOMA BY X-RAYS.

Johnson and Merrill (Phila. Med. Jour.) report on six cases treated in this way. Case I.—Epithelioma of face in a man of forty-five, recurrent after excision. Fifteen exposures, given every other day. Six months afterwards healed with healthy cicatrix. Case 2.—Ulcerating epithelioma of nose. Exposures of six minutes, given on alternate days. Healing when last seen. Case 3.—Ulcerating epithelioma of lip. Exposures as before. Discharge lessened, and became less offensive, but tumor did not disappear. Case 4.—Recurrent cancer of breast after excision. No change in the recurrent nodule, but pain relieved. Case 5.—Epithelioma of nose. After two months' treatment ulcer healed and tumor diminished in size. Case 6.—Epithelioma of nose, cured after a month's treatment. The authors recommend a soft or low vacuum tube. The healthy skin is protected with tinfoil. The object is to cause a mild inflammation of the diseased tissue, gradually increasing its severity till there is a burn which requires six weeks to heal. Treatment is then suspended for a month, and if a complete cure is not then in prospect the process is continued. The authors recommend the method even in inoperable cases, since it gives relief from pain.

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TREATMENT OF RODENT ULCER BY X-RAYS.

Sequeria (Brit. Med. Jour.) reports twelve cases of rodent ulcer treated by the X-rays. Five cases were healed, and the rest are in various stages of healing. The permanence of the cure is at present uncertain; but the author recommends the method, at any rate, in those cases where removal by the knife is impracticable.

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APPLICATION OF THE URANIUM RAYS TO ENHANCE THE EFFECT OF THE X-RAYS.

E. Grunmach (Bull. So. des Hôpitaux de Paris): A screen of fine linen is impregnated with a solution of uranium—the source of the Becquerel rays—and suspended between the vacuum tube and the subject at a point where the X-ray must pass through it. The shadows cast on the fluoroscope are much clearer and more distinct, and the contrasts are sharper than by any other technique. The finished actinograms are likewise exceptionally distinct, even with obese subjects.

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STUDY OF ROENTGEN PLATES.

K. Ludloff (Ibid.): This communication states that details are brought out more plainly in a Roentgen plate if it is placed over a translucent plate set in the side of a box containing electric lights and reflectors to throw the light on the plate, the room being otherwise dark. Remarkable relief is obtained if it is viewed through an opera or large magnifying glass.

THE ELECTRICAL TREATMENT OF UTERINE FIBROIDS.

Segur (Phila. Med. Jour.): Electricity, properly applied, may be considered a specific for uterine fibroids. A moderate dosage, from 40 to 50 milliamperes, applied for twenty or thirty minutes, relieves pain and induces a diminution in size. There are no dangers to be feared from its use, if carefully conducted. Puncture is not necessary in order to obtain practical results. No serious operation should be undertaken until after electricity has been tried.

◆

CHEMICAL ELECTROLYSIS IN HYPERTRICHOSIS.

E. A. Weil (Bulletin d'Electrothérapie): Instead of the tedious intrafollicular electrolysis, Weil applies the electricity all over the surface, first pulling out the hairs and moistening the surface with a solution of nitrate of silver or of chromic acid. Under the influence of the electricity, the cathions, the silver and chromin, pass into the follicles and, combining with the chlorin of the tissues, evidently form an insoluble silver chlorid which prevents further growth of the hairs. Experiments on himself showed that the destruction of the hairs on the spots treated was complete.

◆

TREATMENT OF ACNE BY X-RAYS.

Ullmann (Wien. klin. Woch.) reports a case of severe acne of the back in a patient aged sixteen, treated by the X-rays. Fifty exposures of half an hour were given. After fifteen sittings the acne spots swelled, and there was diffuse erythema of the skin. Afterwards the acne spots shrunk, while the skin over them exfoliated.

◆

THE MOST UNIQUE AND PROMISING THERAPEUTIC AGENT.

The Medical Council (Phila.), among other questions propounded to its readers, put the following:

"What therapeutic agent is unique, the most promising, the slowest in developing, one of the least taught, and yet fraught with possibilities that transcend imagination? Give reasons."

The answer was forthcoming as follows:

Electricity is the therapeutic agent that is unique, the most promising, the slowest in developing, one of the least taught, and yet fraught with possibilities that transcend imagination.

That electricity is unique as a therapeutic agent is so self-evident that it needs no special elucidation. That it is the most promising of our therapeutic agents it must be conceded when its wide scope and general (almost universal) applicability is realized. This is also self-evident to electro-therapeutists, but not so to the bulk of the profession, who have not studied it in college, and who have had no opportunities for doing so afterwards. There are practically four electric currents that can be used in the treatment of disease, each competent to do some special work that any of the other currents cannot do. They are the galvanic, faradic, alternating, and static. With them electrolytic (chemic) changes may be induced in varying degree, from slight effects upon diseased tissue, without injury to normal structures, up to rapid destruction by the electro-cautery in operative work. Heart muscles or nerves and nerve tissue may be stimulated and local and general nutrition improved. Pain may be relieved, and healthy processes induced in chemically diseased structures that defy every other known remedial method. It is the slowest of all remedies in developing because its teaching in the medical schools is usually but an incident in the teaching of nervous and mental diseases, a branch in which it is even yet not necessary to fully qualify for examination. After graduation, few men seek to qualify themselves in its use for several reasons, among which may be mentioned the expense of equipment, the confused nomenclature of the subject, and the delicacy required in electric treatment, failure to observe which insures negative or positively harmful results.

The future of electro-therapeutics is fraught with possibilities that transcend imagination because of its wide range and variety of otherwise impossible effects. Take, for instance, the use of cataphoresis, or anodal diffusion, which is a better name for the process by which medicaments may be rapidly passed through the tissues to any point of the body without the aid of either the digestive or circulatory organs. Better known, still, though of more recent date, is the extraordinary action of the X-ray. Add, then, to these reasons the other well-established properties of electricity and consider that it is still in its infancy, and its future possibilities are evidently enormous and of transcending scope.

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TREATMENT OF CYSTITIS WITH ELECTRICITY.

BY M. BONNER FLINN, M. D., WORCESTER, MASS.

I will not enter into the full clinical history of the various forms of cystitis, but will speak briefly as to the best and most direct methods of applying the electrical currents in the different forms of the disease, such as are amenable to medical treatment.

Hypertrophy of the bladder is a common accompaniment of cystitis; either eccentric hypertrophy, or hypertrophy with dilatation, or concentric, or hypertrophy with contraction; and electricity relieves either of these conditions after a few treatments.

In addition to the medical treatment usually followed in this disease, I find that, in a local and general application of the electric currents, we have a powerful adjunct in relieving and restoring the loss of power.

Either galvanic, primary, or secondary faradic currents may be used.

In acute cystitis the bladder, irritated and intolerant of its contents, is soothed by the sedation produced by the local and general application of the faradic or mixed currents.

The use of the galvanic current, 5 to 15 ma., will give relief and restore to normal action in quite a large percentage of cases.

Personally, I prefer to use the faradic and the primary or coarse-wire coil, instead of the galvanic current, in the majority of cases, as the treatment can be prolonged. This I find to be necessary to obtain enduring results. At times I have used a steady, mild current for over an hour, especially in the acute form of the disease. The usual treatments of half an hour are ordinarily sufficient, twice daily or at longer intervals, as the case may require. I always advise a rest of an hour or longer, after each treatment.

DIFFERENT MODES OF APPLICATION:

(*a*) In treating cystitis, I irrigate the bladder freely with a solution of boracic acid, hydrastis, or any other drug most suitable to the case. Leaving the bladder partially filled with the solution, I introduce into the bladder a metal electrode or silver catheter, to which I attach the anode; the cathode is placed on the lumbar region, then connect the faradic current of a moderately slow interruption, treating thus from 15 to 30 minutes, or until I give relief. Treatments daily.

(*b*) When there is cystitis with prostatitis, I let the patient sit upon the cathode electrode (perineum) and apply the anode over the supra-pubic region, strength of current pleasant to the patient, 15 to 30 minutes.

In using the galvanic current, the cathode would be in bladder; anode over the bladder or sacrum, 6 to 10 minutes, 5 ma.

(*c*) In treating a female patient, in addition to the above treatments, I obtain very good results by using the vaginal electrode attached to cathode, which brings the current into more direct contact with the walls and neck of the bladder; using the anode over the abdomen or through the urethra. By this mode of treatment the opportunity of reaching the mucous membranes and pockets of the bladder is better, and good results are much more readily obtained, and the patient frequently expresses her satisfaction at the quick relief from the intense suffering. The condition of the bladder is tranquilized by the action of the electric current on the nervous system.

(*d*) Distention of the bladder will be brought under control by the contracting or tonic action of the electric current on the muscular coats, to wit: use either secondary faradic or primary current by placing the anode on the sacrum, and apply the cathode over the lower portion of the abdomen, using a moderately strong current.

I use this treatment after confinement for retention of the urine. Very often one application of 20 minutes will restore the normal action.

If the urethra is too inflamed for the introduction of the silver catheter, a soft catheter may be used by placing the conductor in the irrigating solution, as the current will follow the flow of the fluid into the bladder. If it is impossible to pass an instrument, I use for a few days treatment (*d*).

(*e*) In gonorrheal cystitis, with chronic inflammation of the deep urethra, as a sequel to gonorrhea, we are prone to have frequent exacerbations. These conditions can be relieved and cured by frequent applications of electricity, and it will assist any other prescribed medical treatment.

I have never found the currents to aggravate a case, if due caution was observed as to the strength of the current and character of the vibrations, or in the use of the galvanic current, if properly measured.

It is reckless to place the treatment in the hands of the laity. I fully believe that only the experienced physician should give the treatment, as he alone would be qualified to judge of the results during or following each application of whichever current may be selected by him, as each case is a law unto itself.

THE NEW SIGMOID ELECTRODE AND ITS APPLICATION IN DISEASE.

BY M. B. PEARLSTIEN, M. D., BROOKLYN.

Of late years the use of electricity has attracted a great deal of attention among the general practitioners, and more so among specialists.

Though up to the present time of medical science, we cannot give a true definition of electricity, we know many of the laws regarding its applications, and results obtained.

Electricity has a variety of actions, according to the methods of application used, and all of which are derived from three different and defined currents, viz.: Galvanic (also cautery), faradic, and static. The following are the numerous actions we can obtain from the above-named currents:

Liquefying, coagulating, absorbent, stimulating, sedative, antispasmodic, tonic, alterative, promoter of development, vesicant, counter-irritant, chemical cautery, and hemostatic. We also use medicated and cataphoric electrolysis.

Having described the different actions obtainable, I will briefly consider three essential things that are necessary to study and be familiar with:

(1) The anatomical structural change; (2) the quality of a current and electrodes used; and last, but not least, the resisting power of the human body and the density of a current.

I will also mention several types of patients that are very much benefited or cured by means of electric treatments.

(1) Those of a neurasthenic affection; (2) disorder of the digestive organs and alimentary canal; (3) morbid or diseased conditions of the pelvic organs; (4) benign or malignant growths and tumors; (5) gout, rheumatism, etc., etc.

Of all our office patients and of those mentioned above, my experience teaches me that a majority of them suffer either with disorder of the digestive organs and alimentary canal or diseased condition of the pelvic organs, or both; and it is in these cases where electricity is always indicated.

A very important factor in electro-therapeutics is to employ the right kind of an electrode in a certain morbid condition, as our results depend greatly upon the proper adjustment of both battery and electrodes.

The electrode I desire to place before the medical profession is one of the utmost value in prolapse and catarrh of the sigmoid, prolapsus ani, internal hemorrhoids, proctitis and periproctitis, prostatitis and hypertrophy of the prostate gland, habitual constipation due to any one of the above conditions; also in all irritable states of the rectum and anus. The electrode (Fig. 1) is made from light aluminium tubing, its thickness, length, and shape is so constructed that it will pass through the diseased or irritable rectum into and up through the sigmoidal fossa with comparative ease.

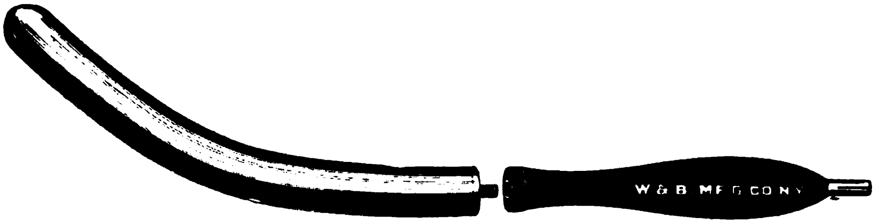

FIG. 1.—Pearlstien's Electrode.

Its length is 7 3-4 inches, its thickness across measures five-eighths of an inch, and it weighs 1 1-4 oz. (with handle 2 1-2 ozs.). It is free from any insulation or covering, therefore coming directly in contact with the diseased parts. The handle, which is attached to the electrode by means of a thread, can be detached and the electrode sterilized as often as desired.

I will briefly describe the methods I use in treating the different affections of the rectum and anus already mentioned.

The battery used in these pathological states is a dry-cell faradic battery (Fig. 2), except for stricture of the rectum, when the galvanic battery is indicated.

First lay your patient on either side, with knees drawn up. The sigmoid electrode (Fig. 1) must be well warmed; anoint same with vaseline or lard; then wet sponge electrode (Fig. 3) with hot water. Introduce the electrode (Fig. 1) slowly and gently into the rectum; follow the course to the sigmoid, and through it. Having done that, attach the battery cords to both sigmoid and sponge electrodes, placing the latter over the lower part of the sacral region. Now turn on a mild current and gradually increase to the strength the patient will bear. Move the sponge electrode around and about the sacral and coccygeal regions from five to ten minutes, then place same anteriorly over the lower part of the abdomen and more

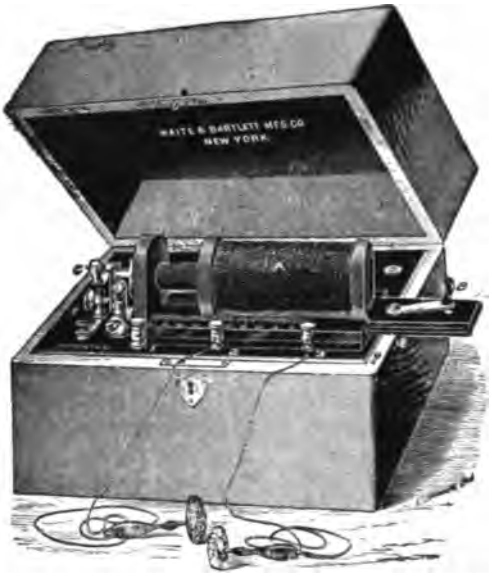

FIG. 2.

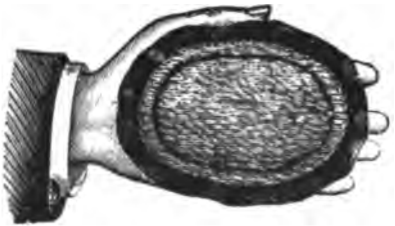

FIG. 3.

to the left, where you want to apply massage; moving your sponge to and fro the same length of time as you did posteriorly.

In placing and moving the sponge electrode over the parts described, we produce our medicinal action upon the nerves (cerebro-spinal and sympathetic), supplying the diseased parts. It is, therefore, very important that the directions as to the application of the sponge electrode should be followed.

Many practitioners prefer a plate to the sponge electrode, but I find the latter inconvenient. You cannot move it around and massage with it as you can with the sponge electrode.

In prostatitis and hypertrophy of the prostate, use the sigmoid electrode in the same manner as heretofore described, and place the sponge electrode over the perineum for about ten minutes; then placing same over the bladder, keeping it there the same length of time. It is sometimes necessary to use a urethral electrode per urethra instead of the sponge, but as a rule the latter will answer the purpose. For stricture of the rectum the electrolytic (galvanic) method is of the utmost value and is safe.

Should you experience any difficulty in introducing the sigmoid electrode, inject with a syringe, through a blunt-pointed nozzle into the rectum, about 10 min. of fl. ex. lobelia, and within about five minutes, if the electrode be well warmed, you will be able to introduce same with comparative ease.

Attach the cords in the same manner as already described, applying per rectum the negative pole of a galvanic battery.

Use from 5 to 20 milliamperes, for about ten minutes at a sitting. Where you employ rectal electricity, treat your patients two or three times a week and, if necessary, oftener.

Having described the application of electricity in diseases we so much come in contact with, there is still one more thing, playing a very important factor in all rectal irritations, and that is rectal dilatation (Fig. 4).

When used alternately with electricity, the results we obtain are marvelous.

We must dilate the sphincters moderately, using no more than two sizes, ten minutes each to a sitting; otherwise the reaction will cause more irritation, and as a result will do more harm than good.

The dilators, like the sigmoid electrode, should be well warmed before they are used.

The patient may obtain a set of dilators (steel, aluminium, or hard rubber) from any surgical-instrument establishment and use them himself before retiring. They produce a soothing or sedative effect upon the general nervous system and thus induce rest and sleep.

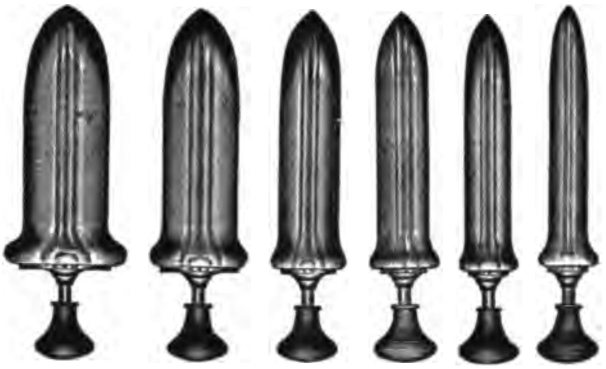

FIG. 4.—Pratt's Rectal Dilators.

THE NEW SIGMOID ELECTRODE USED IN "SUBINVOLUTION."

Arrested involution of the post-parturient uterus, whether due to inertia, idiopathic or traumatic infections, is more successfully and quickly treated by electricity than by any other means at our disposal.

Sanguineous discharges, continuing beyond the normal periods of their appearance, may be controlled by from three to five treatments. In both cases we use the faradic current, beginning mild and gradually increasing same. Sometimes galvanism is indicated, and if so, use the positive pole per uterus. The sigmoid electrode is just the size and shape for use in these conditions. It can be sterilized at ease and used as often as indicated.

547 Madison Street.

STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

BY WILLIAM BENHAM SNOW, M. D.,

Late Instructor in Electro-Therapeutics and Nervous Diseases in the New York Post-Graduate Medical School and Hospital.

CHAPTER VIII.

GENERAL PRINCIPLES OF ELECTRO-STATIC ADMINISTRATION AND THERAPEUTICS.

The administrations of Franklinism are governed by general principles which, when once understood, constitute a basis for correct and successful operation.

The subjects for general consideration are the patient, the dosage, and the frequency of treatment.

I. *The patient*, who comes for the first static treatment in this age when criminals are electrocuted, citizens killed by live wires, and buildings burned through effects of poor insulation, is usually in a state of trepidation, and the numbers who do not come, for the same reason, are legion. Humbugs, quacks, and charlatans have made it a byword and subject of jest with the specialist and family physician, who may know little about its use; and, therefore, the patient's mind is terrorized, prejudiced, and skeptical before we see him. The first step, then, is to enlighten and calm his fears at the first interview, which may be accomplished in all but a few cases, but requires (1) an explanation of the absence of danger from currents of high potential and *infinitesimal* quantity, and (2) the administration of the treatment without blunder or accident, thereby winning confidence, and (3) the management of the treatment in such a manner that some degree of benefit is derived from the first application.

To convince himself that the maximum output of the machine could not kill a patient, the writer once made the following experiment: A little mouse was captured and

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* Copyrighted.

placed in a paper box having one side of glass. A small hole was made in one end, and the box was then set upon a metal plate, which had been already placed upon the insulated platform. The shepherd's crook was then connected from the plate to the machine, and the machine set in very rapid motion. Upwards of forty very long indirect sparks were then administered to the body and head of the little animal, and still he survived. That cruel experiment has served as a convincing argument to many timid patients and fully reassured the writer of the absence of all danger.

If the patient's affection is such that vigorous sparks are necessary to relieve the suffering at the first treatment, explain that it will be painful and then proceed. The writer recalls cases of podalgia, chronic rheumatism, etc., where nothing else would have given relief. As a rule such heroic measures are not necessary to give marked relief, though they may be required later in such cases. The patient's first few treatments may then be relatively mild. Generally, however, it is not safe practice to fail to make a favorable impression by giving some marked evidence of benefits in the early days of treatment, and it is rarely difficult to do so in cases to which the treatment is adapted; in fact, the first few treatments are often marked by such a degree of improvement that patients are impatient when it takes considerable time to effect a complete cure. Accidental sparks, shocks, and surprises generally are inexcusable, and, though they do happen with experienced operators, are certain to lessen the patient's confidence and awaken fears and doubts which subsequent arguments and explanations may not satisfy.

The idiosyncrasy of the patient, except from the effects of experience with other currents or the notions of prejudice or fear arising from other sources, is not nearly so often a factor to be considered, when administering static electricity, as laymen and physicians unfamiliar with its effects suppose. This is especially true of all forms of administration except the sparks when employed (as they should be) without accidents, because there are no shocks, unpleasant sensations, or physiological effects to disturb the patient's equilibrium. Apprehension of impending danger is the only element in impressionable patients with which the operator has to contend, and this will depend largely upon whether the patient has confidence in his attendant. Under such conditions, and possibly in a few others, instead of the usual glow which accompanies the administration, there may occur a condition, which has been described by others, in which "the patient remains chilly, depressed, and apprehensive." In most of these patients the effect is said to disappear after a few treatments. As the writer has never noted such effects, he can only quote the experience of those who have.

It is not unusual, with patients in whom the secretions are inactive, especially true of neurasthenics, that during the first few administrations they do not perspire.

The skin of some patients is especially susceptible to the convective and disruptive discharges; an unpleasant pruritus may persist for several days following an application. Wheals and even blisters have followed an application of the spray or sparks. With patients in whom the circulation is not good, and the reactions sluggish, a treatment by sparks may be followed by a mottled appearance, which may persist for twenty-four hours or even longer. Such effects disappear as the general health of the patient is restored.

When the dosage and form of administration are once regulated to the physical and local conditions of the patient, and the harmless character of the application fully explained, the number to whom the currents cannot be administered will be small indeed.

II. *The dosage,* the amount of current or other form of administration to be employed, and the length of time or number of sparks, can be regulated only by clinical experience and the study of individual requirements. To obtain a positive impression, generally, for either local or constitutional effects requires a minimum, we believe, of ten minutes' time with the wave current or either form of electrification or the convective discharges; and to obtain the best results often demands as many as thirty minutes, which may be considered a maximum requirement. An over-dose or too prolonged treatment may be followed by a sense of weariness and sleepy condition, never dangerous and always relieved by rest. When employing sparks, be governed in acute painful conditions by the relief afforded. If at first the improvement is but partial, and the patient does not object, persist until relief is complete, or at least nearly so; taking care to give no careless or unnecessary sparks, but applying them directly to the lesion, where they are certain to be the most painful. The patient soon discovers that sparks so applied are followed by the greater relief, and enters into the spirit of the treatment and directs the application to such points.

From time to time, in each case, be governed by the results of previous administrations, and learn to regulate the dosage to the individual, as in all other methods of medical practice. We believe, however, that in no other form of practice is the patient's *say so* in the matter of dosage more to be considered.

III. *The frequency of administrations* is a matter of the greatest importance, and we are convinced that the oft-repeated remarks of those who have carelessly employed static sparks, that "the relief is only temporary and does not cure," are due to want of thoroughness and failure to again administer the treatment before the relapse has been complete. The treatments should be repeated as soon as a commencing relapse is evident. *Bridging* is the term the writer has employed to express the repetition of treatments to prevent at most but partial relapse to the condition relieved. Whether we are treating a painful or inflammatory condition, or a case calling for a tonic effect, *the golden rule is to bridge the condition of relief from treatment to treatment, lessening the frequency as the requirements permit.* Rarely will this rule call for more than one treatment in twenty-four hours. Occasionally, however, in acute inflammatory conditions, two treatments daily may be required for a few days. When employing Franklinism to obtain the nutritional effects, best results are derived from daily administrations for the first two to four weeks, to be determined by the progress of the case.

The knowledge of the physiological actions and effects of the different forms of administration suggest to the physician a large range of therapeutic indication, and in a general way the choice of modalities. There are, however, definite methods which experience has demonstrated will produce the best results. A classification is adopted in these chapters which groups the conditions with reference to types having similar indications for treatment, without reference to the ordinary classifications in text-books. This is done for the purpose of impressing upon those unfamiliar with the methods indications in many affections which the limited scope of this work will not permit.

It is hoped that, by particularizing in a number of cases which demonstrate the various effects, applications to special work will suggest themselves to the reader.

Only the conditions in which success has been achieved, in groups of cases, by the writer and others, will be considered. With such it is the purpose to be explicit and exact, trusting that good results in their hands will verify the truth of the statements.

We ask the indulgence of such as are unfamiliar with the subject; that they defer judgment until such time as there may be an opportunity to prove the truth of the statements. For there is wonderful progress in the uses of electricity in every field, and in medicine progress keeps pace.

So numerous are the diseased conditions associated with *hyperæmia* and *congestion,* and so certain are the demonstrations that they are relieved in a large number of cases where no other means are so effective, that it is more difficult to discriminate in what cases it is not indicated than to discover indications for its use.

In *paralysis* and *spasmodic conditions,* not of central origin, success is certain in all recent cases, and beneficial in most chronic ones. The same is true in peripheral *painful neuroses,* atrophies, anæsthesias, and functional disorders in general.

When *errors of secretion* or *excretion* exist, the prognosis will depend upon the condition of the organ in question. If the derangement is but functional, the prognosis will be good in most cases. Presumptuous as these statements will seem to many, let it be borne in mind that static electricity, scientifically applied to the human organism, is the ***sine qua non*** for activity, not of one cell but of all, not of one organ, but of all organs.

Equilibrium, to be restored, requires only properly regulated frequency and dosage, together with proper adaptation of food, habit, and environment. Functional derangements are cured and patients recovering from protracted fevers have their convalescence materially hastened.

CHAPTER IX.

ELECTRO-THERAPEUTICS OF INFLAMMATORY CONDITIONS.

Few pathological conditions are not characterized, to a greater or less degree, by congestive or passive hyperæmia. Irritants enter the economy, either as such, or from defective actions within the organism become irritants and induce local congestion. Accidents occasion traumatic congestions, which have received little attention from the electrotherapeutist. In no class of cases to-day is static electricity more successful, or other means—as a rule—so unsuccessful, as in hyperæmias and congestions.

For convenience of classification, we will divide the inflammatory conditions into (1) those characterized by the presence of micro-organisms, either demonstrated or suspected; (2) those due to bone necrosis; (3) traumatic affections, with and without solutions of continuity; (4) those arising from some dyscrasia, cachexia, or diathesis; and (5) those arising from functional inactivity and unknown causes.

I. The static forms of administration have little effect upon germ life, as upon other forms of cell protoplasm, except possibly upon those with which large productions of ozone may be brought in contact, and destroy their vitality by oxidation. Such administrations are applied with difficulty and uncertainty to all but superficial lesions, which will be treated in a chapter devoted to diseases of the skin. In tuberculosis we believe that the bacillus is not destroyed, except superficially, by any direct effect of the static modalities upon the germs, either by cataphoresis or ozone within the tissue, as some would teach us or we ourselves hope to demonstrate. We take this position because it seems to be physically impossible. Ozone inhalations are generally irritating when administered in sufficient quantities to be effective, but some report success from special devices which get rid of irritating properties.

That the penetrating effects of rays of light, especially the rays emanating from an excited Crookes tube, are effective in destroying tubercle bacilli and other forms of micro-organism, especially the suspected germs of carcinoma, is an open and interesting field of investigation, in which results already obtained promise much. (See chapter on "Therapeutics of the Roentgen Ray.")

That static tonic administrations do assist in curing incipient forms of phthisis by restoring the general health of the patient, thereby removing the lowered conditions essential to the growth of the bacillus, is an unquestionable fact.

II. In inflammatory conditions occurring with bone necrosis, where nature is attempting to remove the dead fragment, no measure but the surgeon's can be effective.

III. *Sprains and bruises*, not complicated by fracture, severance of ligaments from their insertions, muscular rupture or laceration of the integument, severe though they may be, yield more promptly and completely to electric treatment than to any other. The wave current, the brush discharge, and sparks are the modalities effective. The wave current should be administered to the surface or joint by placing the metal electrode in close contact with the part affected, and then regulate the length of the spark-gap to the case—employing it always as long as it can be used without producing painful contractions of the muscle. Continue this treatment for from ten to twenty minutes, bearing in mind that the longer time is sure to be effective, while often less would not suffice. In many cases the wave current will be all that is required, in others the administration of the brush discharge, employing the wooden ball electrode, will still further remove superficial tenderness or swelling. Many cases, especially about the face or hands, where the tissues are not dense and deep, and the small muscles are so sensitive to the wave current, can be completely relieved with ten to twenty minutes' application of the brush discharge, the time depending upon the severity of the case and the extent of the area affected. When applying the brush discharge it must be constantly moved about, or it will otherwise be quite intolerable.

When the deep structures of large joints are involved, or in very stout patients, it will often be necessary to employ longer or shorter sparks directly to the affected region. The indication for the application of sparks will be the persistence of pain on motion, felt deep in the structures of the joint after treatment.

The results from these methods are uniformly good. The pain and swelling will be much diminished at the time of administration, and cases of not more than twenty-four hours' standing will be uniformly cured in from three to five days, during which time the patient will be permitted to make moderate use of the part. In cases of long standing a varying length of time will be required, but improvement will be marked and satisfactory from the first. Severe sprains, complicated by rupture of the ligament, are satisfactorily treated in the same manner, and though the time required to effect a cure is longer, progressive improvement will be marked.

When there is an abrasion in the vicinity of the sprain or bruise, avoid placing the electrode or making an application of the brush discharge directly to the open surface, as it will be too painful, the most of the current entering at the injured spot.

After a *fracture* is united, great benefit may be derived from static applications, both to give tone to the muscles which have been at rest and to remove incidental œdema, which is apt to be present. Success in this class of cases may be directly attributed to the effects of lessening congestions, and at the same time hastening the processes of repair.

We will add, for emphasis, that, from results in uncomplicated traumatic injuries, we have an unquestionable demonstration of the fact *that the electro-static administrations do lessen congestion.*

IV. In the management of the rheumatic and gouty diatheses, as well as the conditions present in rheumatoid arthritis, the results of treatment may be said to be threefold. (1) There will be in most cases a prompt relief of the local condition; (2) a marked improvement in the patient's general health, and (3) a decided increase in the aggregate of solids eliminated with the urine.

The first is due to the effects upon local metabolism and the lessening of the congestion present; the second to the general effects upon nutrition, and the third (a very important one) shows a disposition towards the elimination of the products of imperfect combustion which have been locked up in the tissues.

RHEUMATISM

is a diathetic disease, of which a true ætiology is little understood, and, whatever medicinal treatment we employ, its use is empirical. In rheumatism undoubtedly, as in gout, myalgia, and rheumatoid arthritis, there are two indications for treatment—the diathesis and the local manifestation. In acute rheumatic fever, undoubtedly the indications for medicinal treatment is of first consideration. With the rheumatic diathesis, however, all medicinal treatment seems to fail and the opinions and remedies are numerous and variable, as in all diseases for which no satisfactory plan of treatment is recognized.

The associated conditions present with the rheumatic diathesis may be attributed largely to functional inactivities resulting either from physical organic defects, or improper habits of diet or exercise, or more or less of each or either.

Franklinism we believe, from analogy and experience, well meets the requirements to relieve both the constitutional and local conditions; at the same time, the correction of the habits and diet in whatever may be found to affect the individual status is essentially indicated.

The constitutional treatment should be thorough and general, receiving as much attention as the treatment of the local manifestations. Apply the block tin or lead electrodes closely, securing them with bandage to the affected joint, employing the wave current with as long a spark-gap as can be administered without causing painful muscular contractions. If two or more large joints are affected, or for some reason it is desirable to make an application to the abdomen, or back, or over the liver, with a view to increasing the activity of its functions, the modified wave current may be employed, as shown in Fig. 14. The advantage of the latter is that two or more large joints can be treated at one time, when, with the wave current, there might not be sufficient energy to produce the desired effect upon but one. The rheophore connected with the machine will produce the more potent effect, which the electrodes may be variously arranged to equalize. It may be varied by placing the electrode receiving the stronger effect upon the less sensitive joint, as the knee, and the other on an ankle; or by using a larger electrode to one and a smaller to the other; or by connecting several electrodes which have been secured to more sensitive joints to one point, as the Leyden jar, and one or more electrodes similarly placed to other joints, or to an indifferent surface, as the abdomen or back, to the machine. It will be easily seen that by such means much time can be saved when many joints require treatment; but, to obtain the best results, considerable tact and experience will be required to equalize the effects.

To obtain the desired results upon the local congestion, the vibration should be intense and the oscillations frequent. When there are few joints requiring treatment, and the capacity of the machine at the time is capable of producing the desired intense vibratory effects, the wave current (Fig. 11) is to be preferred because the tonic effect is in proportion to the length of the spark-gap—other things being equal. In any event, one administration of the wave current for at least fifteen minutes should be given during each sitting, for its effect in stimulating secretions and excretions, so important for the relief of rheumatic conditions. The time devoted thus to each joint should be not less than fifteen minutes, and daily until the acute symptoms subside.

In addition to the wave current, or condenser current, sparks will be indicated in proportion to the depth and chronicity of the lesion. No form of administration is so effective in the production of local effects upon deep structures, and for removing the products of inflammation, as long, clean, indirect sparks. We therefore find them indispensable, and effective, in rheumatism affecting the hip, knee, ankle, and shoulder-joints especially, and often in the smaller joints as well; their use always following an application of the wave current.

A general administration of sparks (in lengths proportionate to structures), ending with an active general friction applied very rapidly over the whole person of the patient, is a most valuable measure for clearing the tissues by promoting a general and active metabolism. They may be administered in a very rapid and unobjectionable manner, to which the patient will consent. (See " Friction Sparks.")

Another measure invaluable in the treatment of rheumatism is the brush discharge, and, if time will permit, it will be found of advantage in the treatment of each case, and sufficient for its local effect, in a very large number of cases. No form of administration will give greater satisfaction in any affection than the brush discharge in many cases of acute articular rheumatism, after an administration of ten minutes, during which interval the wooden ball is moved rapidly about over the affected surface. The relief from pain is usually prompt and enduring; much swelling will often disappear during the administration, and a complete disappearance of the trouble may take place in a few days. The technique is simple and requires but little skill. (See " Convective Discharges.") The material of which the wooden electrode is made is a matter of the utmost importance—soft maple is one of the best. The writer cannot yet demonstrate it and the literature on the subject is not along the line of the above plan of treatment; but, so far as we have had opportunity to determine, we believe that electro-static treatment of fairly young and robust adults, when continued for sufficient periods of time, will effectually cause the elimination of the materials which seem to induce the acute attacks.

MYALGIA.

Muscular rheumatism, wherever it asserts itself in the muscular system of the body, is one of the affections in which electricity, especially static, has long been recognized as a specific. Sparks—long, short, and friction—have held monopoly in these cases, but the wave current greatly aids in the severer forms of lumbago, and may be wisely employed in all chronic and severe forms; as may also the brush discharge, which very effectually meets the indications.

GOUT.

An attack of acute gout can either be cut short or greatly alleviated by the use of the brush discharge, or the wave current, in conjunction with the usual colchicum. The relief afforded by an application of the brush discharge to an acute gouty arthritis is most gratifying to both physician and patient, when pain ceases and swelling diminishes during a ten- or twenty-minute administration. If the attack is acute, and it is possible for the patient to receive two treatments in twenty-four hours, during the first days of the attack, it will hasten favorable results. We believe that time will demonstrate that no plan of constitutional treatment is so well calculated to promote the elimination of gouty accumulations in the system as the properly regulated and systematic administration of static electricity; employing the same general plan advised in the treatment of rheumatism. Such treatment should be thorough and persevered in for months, in conjunction with a well-regulated diet.

RHEUMATOID ARTHRITIS.

Since the writer first became familiar with the remarkable effects of static electricity in the treatment of this most intractable disease, in 1898, he has sought in clinic and practice every opportunity to study and investigate its effects, and usually with gratifying results.

The observation since that time of a large number of cases affords a basis for the statement and conclusions which follow; taken from a paper read before the American Electro-Therapeutic Association at Washington, in September, 1899:

"SUMMARY OF RESULTS OF TREATMENT.

"I. Patient is always relieved by first, and greatly relieved by the first few treatments.

"II. If case is not of too long standing, the joints are not only made freely movable, but straightened, and Heberden nodes removed.

"III. After a daily treatment of from seven to ten days, a constantly increasing interval may generally intervene without return of symptoms.

"IV. During the course of treatment no extension of the processes will take place.

"V. We believe, though experience is not long enough to affirm, that in a large number of cases a complete cure will result."

Some of the cases at that time reported have continued well; all are better; and in not one has the process extended.

When instituting treatment of a new case, a fairly accurate prognosis of the result of treatment can be given from a radiograph taken at the time. Whenever the inter-articular cartilages are intact, as indicated by the light line between the phalanges, experience from results teaches that the other joint structures are also unaffected, and recovery of the affected joint will be complete; while in joints where that cartilage is more or less involved the joint can never be normal, but will remain entirely or partially stiff after the active processes are checked. Radiography has also demonstrated the absence in every case examined of so-called chalky accumulations, as well as a differential diagnosis between a class of cases distinct in every way from rheumatoid arthritis.

Investigation seems to establish another truth, valuable in determining the prognosis as well as course of treatment, i. e., rheumatoid arthritis seems to be in most cases a secondary disease, following pelvic derangements in women, anæmia, nephritis, rheumatism, chronic malarial poisoning, and other constitutional diseases. It is not impossible that the cachexia present may so affect the trophic centers as to induce the processes of the disease. It is certain that stimulation of the centers, coincident with active treatment of the affected parts, does restore nutrition, remove the products of tissue necrosis, stop the progress of the disease, and cure the case, if the functional organic or mechanical cause of the primary lesion can be either removed or rendered less serious. In no case will the arthritis progress if the treatments are repeated at recurring intervals, the frequency always depending upon the individual characteristics of the case. The treatment of the primary lesion by mechanical or other means is a matter of as much importance as the treatment of the local lesion, if the results are to be permanent. The electro-static treatment of many cases seems to be all that is required. Especially is this true in simple anæmia, rheumatism, neurasthenia, and some pelvic disorders.

The plan of treatment is essentially the same as in the treatment of rheumatism. The constitutional treatment is of the utmost importance and never to be neglected. Each finger should be covered with block tin—narrow strips, bound about the fingers, are the most convenient means. When applying tin about large joints, the writer usually slits the square or rectangular pieces of sheet tin (see Fig. 16), so that they may be adapted to the joints. For best results the wave current or derived currents should be administered to each joint affected, for from ten to fifteen minutes. For this purpose much time will be saved by connecting several joints for one administration. When treating in this manner take care that the joints are about equally sensitive to the current. For example, the hands, wrists, forearm, and temporo-maxillary articulation will endure about the same current, and the shoulders, ankles, and feet a much larger voltage. As a rule the knees, singly or together, will require in an adult as much current as a machine will excite. The writer has frequently employed a spark-gap of ten to twelve inches when treating two knees with the wave current. The longer the spark-gap that can be employed in every case without causing discomfort, the greater the effect upon the local congestion.

A very liberal application of sparks—short ones one-half to three-quarters of an inch in length to the finger-joints, and relatively longer ones to the other joints—is indispensable, if success is to attend the treatment of rheumatoid arthritis. Painful as they are, an average of about ten sparks to each finger-joint seems to be required. These are best borne when the operator takes a single spark from each joint, and passing back and forth along the rows of knuckles, completes the required administration.

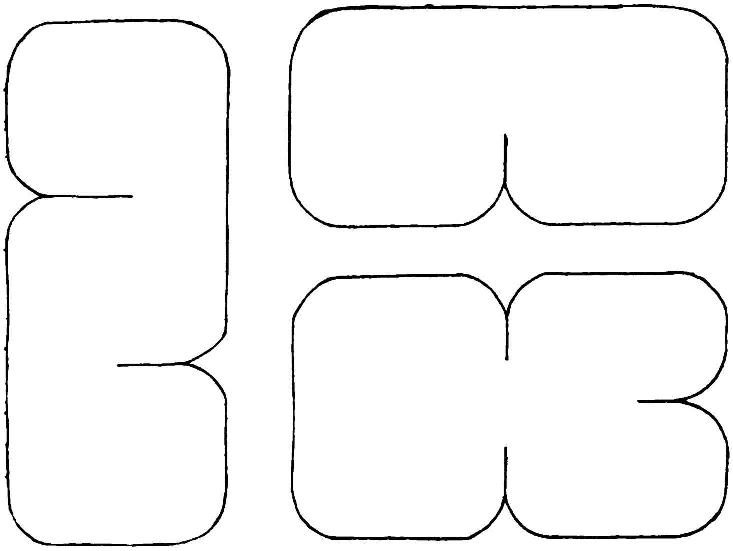

FIG. 16.

Patients should be treated daily until the effects will *bridge* longer periods. The intervals should not be longer than three days, until cured. The promptness with which relief follows will vary greatly with the cases. Some will be cured within two months and others will require as many years. Particular attention must be paid to the constitutional treatment and the removal or relief of the primary disease, and satisfactory results will follow.

OSTEO-ARTHRITIS.

This affection is distinct from rheumatoid arthritis, and has long served to confuse the professional mind and literature on the subject. It occurs usually in healthy, well-nourished individuals of the better classes, and begins to appear at or about the menopause in women, and is very rare in men.

The examination of a large number of these cases with the Roentgen ray has convinced the writer that what have so often been considered chalky deposits are true osteophytic enlargements of the bones and usually appear at the last phalangeal articulations, as shown in the accompanying illustration. It is incorrect to consider them as of gouty origin, or in any way allied to gout. There is no cure for the condition when once developed. The application of sparks, as in the treatment of rheumatoid arthritis, will in most cases relieve the local pain and inflammatory swelling, and render joints otherwise painful constantly useful. The case represented in Fig. 17 has for two years received on an average two or three treatments monthly, going frequently two or three months without suffering or treatment. The osteophytic enlargements have not increased in size, nor diminished, since they have been under observation.

Sparks associated with the brush discharge give the best results, and should be administered in frequency according to the indications.

SYNOVITIS,

when not characterized by the presence of pus, should be treated in the same manner as the other forms of arthritis, with wave current, sparks, and the brush discharge. The results are uniformly successful, the time necessary to complete the cure depending upon (1) the length of time since its appearance, (2) the general health of the patient, (3) the presence of dense layers of fat over the joint. In the latter very long percussion sparks will be imperative, and much time will be necessary to effect a cure, because the vibratory action of the electro-static currents, or sparks, cannot be brought so effectively to act upon the circulatory and lymphatic structures through a thick, almost non-conducting, cushion of fat.

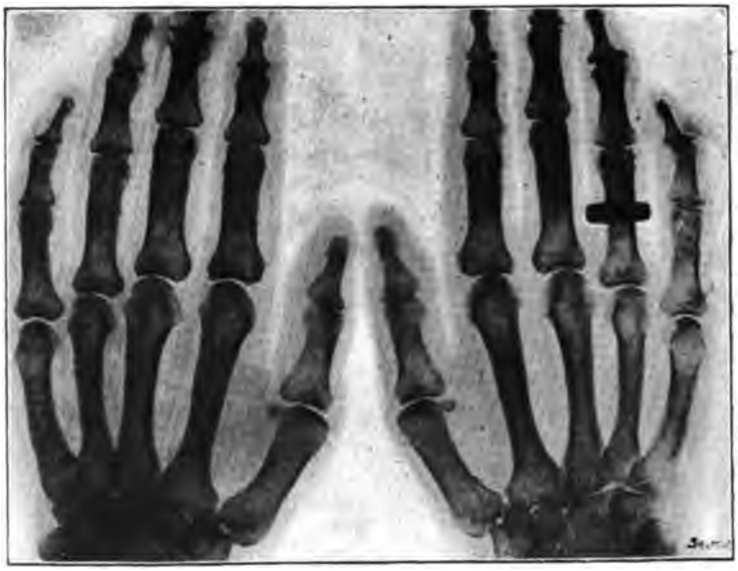

FIG. 17.

Many other affections might be included in this chapter,—as neuritis, coccygodynia, and myelitis,—but it is thought best to include them with other special classifications. The fifth class, including such as nephritis, tonsillitis, and those conditions arising from functional inactivities and unknown causes, will be considered in a chapter on "Constitutional Disorders." *

*** Errata.—Section IX, page 197 of the last issue should read: IX. The constitutional effects of the "two-pole" static induced current are insignificant; in fact, the writer knows no indications to which the other modalities are not better adapted.**

EPITOMES.

THE USE AND ABUSE OF THE GALVANO-CAUTERY IN NASAL SURGERY.

C. D. Conkey (The Medical Age): The author says it should rarely be used in the nose above the lower turbinated bone, on account of the possible danger of setting up inflammatory changes in the brain.

To be of any value at all, the cauterization must be extensive. The cautery is far inferior to the snare in removing polypoid degenerative changes found on the anterior or posterior ends of the turbinal. The septum can seldom be benefited by extensive cautery applications. Those cases covered with markedly hypertrophied tissue or greatly dilated blood vessels may receive the application of a fine linear incision.

The post-nasal space, as well the soft palate and uvula, are places where the cautery is best not used. Great care should be exercised in its use about the base of the tongue or larynx, on account of the danger of producing adhesions.

In its employment on the turbinal the aim should be to do, as near as possible, a submucous operation. This is done by thrusting deeply into the anterior end of the turbinate a real fine cautery point, moving the handle upward and downward.

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TECHNIQUE FOR THE APPLICATION OF THE X-RAY TREATMENT IN PHTHISIS PULMONALIS, AS EMPLOYED BY J. RUDIS-JICINSKY, M. D., CEDAR RAPIDS, IA.

After reciting experiments on various bacilli and noting the bacteriocidal action of the X-ray, on the tubercle bacillus especially, he proceeds to give his technique for treatment as follows:

"The exposure varied, with each case, from ten to fifteen minutes at each sitting. The rays have to be observed with the fluoroscope at each exposure, the tube tested to see that it is working at its best, and the apparatus will also be under the full control of the expert, who, with the help of the X-ray, will not only determine what portions of the tissues are diseased, but locate the area over which the disease extends, and ascertain what changes have taken place since the first exposure.

The treatment ceases with the induction of a favorable condition of the patient, and when the lungs give us upon the plate of the fluoroscope an image of shadows of new-formed adhesions—which are opaque to the X-rays—in a transparent field of healthy tissues. Remember that healthy tissue allows the X-ray to pass freely, and thus we may record the changes, situation, and the size of isolated foci also.

"The patient is seated in a chair without a back, and the Crookes tube held from fifteen to eighteen inches from the body, directly in line with the diseased spot, as shown on the screen of the fluoroscope in the front, which must be applied firmly, and to the bare chest, if necessary. At the next sitting the procedure is repeated, the Crookes tube being in front. The proper distance between the light and the screen is about thirty inches, but this depends altogether upon the character of each given case, and may be gradually extended or diminished. It is very difficult to find just the length of exposure to make in these cases. If the exposure is not made long enough and at regular intervals, the desired result is not obtained, and if it is too long, it may set up an inflammatory action which may cause hemorrhage from the irritated lung tissue and weakened vessels, and accelerate the growth of the bacilli instead of destroying them. In other words, the diseased tissue of the lungs is of such a low vitality that the influence of the X-rays may cause its absorption, or even destruction, before having any marked effect upon the healthy tissue.

"While the removal of the bacilli, or, rather, of the cause, is essential to permanent cure, it is well,—I am speaking of earlier stages only,—in order to retain the patient, to institute some measure to support the nutritional changes in the healthy part of the lung tissue with increased metabolic change, stimulating more rapid and complete oxidation of the blood; and nothing has answered so well in my cases as static electricity, which may be used alternately with the X-ray. Such static electrization tones up the patient for the next X-ray exposure, and, with all the other hygienic and therapeutic measures necessary, according to the symptoms, will give Nature an opportunity to deposit healthy lung tissue, so that repair may take place. The great function of the X-rays—and, in my cases, the results so far obtained are very encouraging—is to destroy the bacilli directly in the lungs, while the franklinization improves and restores nutrition, not only of a part, but of the whole. By such a process of treatment the healthy tissue is kept immunized on one hand, and, on the other, the further proliferation of the bacilli is stopped. The majority of our patients improved, the bacilli disappeared from their sputum, the night-sweats ceased, and now the patients do not cough; they say that they feel better and are restored to usefulness. But I should not like to state that the cases were cured by the X-ray exposure only, for it may have been spontaneous cure in all of them. They are, however, certainly now well, and are feeling in good condition; and, also just as certainly, they had tuberculosis pulmonalis when the treatment began."—New York Medical Journal, March, 1901.

* * *

GONORRHEA TREATED WITH ELECTRICITY.

W. H. Walling, in the Int. Med. Mag., says that the following diseases of the genito-urinary tract may be treated by electricity: Impotence, catarrhal condition of Cowper's glands, spermatorrhea, enlarged prostate, varicocele, hydrocele, stricture, gonorrhea, and syphilis. In speaking of gonorrhea he says that, unfortunately, this disease is regarded by the laity as being of little consequence. It is in reality a very serious disorder; many eminent authorities classing it as being more disastrous than in syphilis. Treatment should be instituted as soon as the disease first manifests itself.

Taken in this early stage it can be at once checked: A suitable-sized copper bougie, insulated to within half an inch of the distal end (a Neumann's sound will answer), and having the patient urinate, apply the cathode to the thigh and the anode to the bougie, pass the latter until it fully engages the prostatic urethra, turn on five to eight milliamperes of current and slowly withdraw the instrument, releasing it at the meatus by a sudden movement. A green discoloration, the oxide of copper, will appear at the meatus, and its character should be explained to the patient. This chemical, liberated by the action of the current upon the metal in connection with the salts present, acts as a powerful antiseptic and germicide, penetrating deeply into the surrounding tissues, thus reaching and destroying the gonococci. Treatment may be given every day for three or four days, or every other day, as may be deemed advisable. Some soothing injection may then be given, together with internal medication, if necessary, and the case practically dismissed.

Gleet may be treated in the same manner, as may any irritable or hyperæsthetic condition of the urethra; the latter, however, receiving milder currents.

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ELECTRO-PUNCTURE IN NEUROSIS.

BY N. B. DELAMATER, M. D., CHICAGO.

Every physician, as well as the neurologist, will meet cases in which there is, as a prominent feature, paralysis, inco-ordination, contracture, muscular twitching or jerking, pain of greater or less severity, anæsthesia, or a parasthesia—persistent, and which none of the ordinary methods or means of treatment seem to affect in the least. The most careful examination and study fail to warrant a diagnosis of any organic lesion. There may or may not have been a history of traumatism.

I must emphasize the necessity for care and caution, combined with the most rigid examination for evidence of an organic lesion in all these cases. We should not jump at a conclusion too quickly that there is present some grave and serious central or neural lesion. There is far too great a tendency, on the part of medical men, to diagnosticate a brain or spinal lesion whenever paralysis or inco-ordination is present. On the other hand, I am inclined to the opinion that neurologists and a small percentage of the general practitioners are inclined to class many cases among the neuroses that have a well-defined pathological base.

A neurosis, as we shall consider it, is an abnormal neural condition without a discoverable pathological lesion.

There can be no doubt that in all these cases there is an abnormal anatomical condition. It is in some cases a slight change in he neurons; in others some change in the blood vessels, but not sufficient to give any positive diagnostic evidence. I think the time is past for us to consider these cases as pure creatures of the imagination. That there are a few cases purely psychical it may be; but they are rare, I am sure. That there are cases in which all these symptoms are feigned for purposes of gain, there can be no doubt. That many of them originate in a mental process is certain, but this very mental process results in change in the nutrition of the neuron, or the coats of the blood vessels. In the non-traumatic cases, fright, great emotional disturbance, severe taxing of the psychical or physical forces, or both, and lightning shocks are the most common originating factors.

Occasionally we find in a pronounced case of hysteria one or more of these symptoms very pronounced, persistent, and aggravating; often lasting for a long time after all other evidences of hysteria have disappeared; so, also, in cases of neurasthenia, we find, months after all other evidences have disappeared, the same thing.

Following traumatism these neuroses are quite common; probably more frequently following blows on the head, next injury to the back, most frequently following railroad injuries. In all these cases it is quite probable that the psychical element, from fright and shock, plays an important part in the causation. The condition known as railroad spine would also come under this class of neuroses. There are frequently prominent vasomotor disturbances associated, but not always.

These cases cause the physician more annoyance and hard study than almost any he has to deal with.

Having determined on the diagnosis, he can but form in his own mind a favorable prognosis. He knows that though the case hangs on, as it will, it is curable; he realizes that he may try one means after another without making the least impression; that he has frequently and is likely in the present case to fail, and have the patient go to someone else, it may be to a competent man, or it may be some quack or faddist, and get a marvelous cure; he realizes that this means a decided loss of reputation for him, accompanied with more or less loss of business.

There can be no doubt as to the possibility of a cure. It will not do to say to the patient, "This is pure imagination," nor is it true; the patient actually suffers the pain or the inconvenience, and knows something is the matter; knows he must have relief.

I admit that suggestion, in one form or another, has not infrequently wrought a marvelous cure; but it will not always succeed; will not, I am sure, even in one-half the cases. Then there are not a few cases in which it is utterly impossible to obtain the essential elements of suggestion. It is impossible to get the mind of the patient to receive a suggestion.

In many of these cases, after having faithfully tried every other means known to me, I have used the electro-puncture, and the result has been very satisfactory indeed. To be sure, it has not cured every case on which I have tried it, but it has given me a much larger percentage of cures than any other one line; and, I am inclined to think, than all other methods combined. By this method cases that had been diagnosticated locomotor ataxia, and that at first seemed to be genuine cases, but on careful examination failed to present some of the essentials of that disease, have recovered rapidly.

Cases of monoplegia, and even of hemiplegia and paraplegia, have made rapid recoveries, and in cases of the most severe, persistent, and intermittent pain, the results have been simply marvelous.

The method of application is as follows:

I always use the galvanic current; attaching one wire to a triangular (any other shape would do as well) platinum sharp needle, the other wire connected with a moist electrode of considerable size, four to eight inches in diameter. If it is a case of localized pain or one in the course of a prominent nerve, I puncture with the needle to a depth of from one to five lines, placing the large electrode so that I do not involve any vital organ within the circuit, and then turn on my current gradually, up to from 5 to 10 milliamperes; hold it at this 2 to 3 seconds, then gradually reduce it. In a case of paraplegia I puncture over the dorsal and lumbar vertebræ; never making over four punctures at any one sitting. In a case resembling ataxia I place the large electrode at the lower extremity of the spine, or use a very large one and have patient sit on it; then make my puncture at cervical region, first two on each side, of spinous processes, the next day just below these, and the next still lower. In this way go down the entire length of the spine, and then commence at the top again.

The punctures always leave slightly irritated spots. I apply no dressing. I have never as yet had any trouble from the irritation. It will be noticed that I have not given any hint as to the selection of the poles. I have experimented carefully with both poles, and am unable to see that I get any better results in this class of cases with one than with the other. I do not want to be understood as saying that there is no difference in the therapeutic action of the two poles, for there certainly is a very decided and marked difference. In this class of cases, however, I do not know what is present. I do not know what I want to accomplish in order to bring about a cure; consequently, I can have no intelligent rule for my application.

The suggestion came originally in desperation. I had tried everything else I could think of; the result was good, and purely empirically I have used it since.

How does it act in these cases; what effect is it that we get? I do not know. I have thought and watched, and have endeavored to get some clew to what I was doing, but have so far failed. I bring it to you, and ask your help in the solution of the problem.

DISCUSSION.

Dr. Wm. H. King: Some things in the use of this method of treatment for the diseases to which it is applicable are entirely new to me. Some years ago, about twelve or fifteen, there was a form of treatment instituted of electro-puncture for various forms of neuroses, especially for sciatica. I tried the treatment then a great number of times. It was very disappointing in a great many instances, and in many instances it was the other way. It seemed to me that if we had a merely functional sciatica, for instance, where there was no inflammation, but simply a functional neuralgia, that the success was very good and marked. In fact, it was so marked that in a few hours, you might say, the pain would leave where it had been continuing for a long time; but where there was any inflammation, or inflammatory condition, or where there was a history of inflammatory condition, I was unable to get any beneficial result; and it seemed to me that we were very often apt to set up an inflammatory condition—that is, to aggravate an old inflammation.

Now I cannot conceive at present, without thinking over the subject more, just where the effect comes in, unless it be largely from suggestion. The history of Dr. Delamater's cases, I should think, would help us out. Taking the two poles, I suppose when you used the positive pole you used the platinum needle, so as not to deposit any of the iron or copper, or whatever was used there. Now, if the positive pole produced an entirely different sensation; that is, if it was of a sharp, stinging character—more so than the negative—if the pain continued longer after the discontinuance of the treatment; that is, the sharp, stinging pain when the positive pole was used, then those are normal conditions, and I should think under those conditions it was not due so much to suggestion; because we know in a normal, healthy state those are normal, healthy conditions. But if he found no difference in the two poles; that is, so far as the patient's sensations were concerned; if he found no difference in conditions following, it strikes me that they are not normal conditions, and that suggestion must come largely into it.

Another point is that I cannot see that the direction of the current in any way could have come into use here. I cannot, at present at any rate, advance an idea as to how this would work, exactly. Perhaps by thinking over it, perhaps by comparing it with the normal electro-physiology, and by taking into consideration carefully the histories of cases, it might be worked out; but at present I, personally, can hardly see how it should work, or why it should work, except upon the theory of suggestion.

Dr. S. H. Aurand: Dr. Delamater said he noticed no difference in regard to results from using one pole or the other. I would like to ask if he noticed any difference in the scar produced by the different poles. I can see, it seems to me, how the general current of electricity might do good in those cases which the doctor describes, and I would hardly consider the effects or results which he obtained from the use of electricity as due to suggestion. It seems to me we get general effects from the electric current, and I would hardly consider them due to suggestion, by using the electric current in that way; but the irritation—the counter-irritation—a good many times will relieve an effect of that kind. I wondered if there was any more difference after using the positive pole than after the negative.

Dr. Delamater: In the matter of the scar, I could throw no light from that. Of course there was a difference in the immediate appearance, soon after the application of one needle or the other; and where I speak of there being no difference in the application of the two poles, I am taking into consideration the results upon the trouble that we have, and not anything in regard to the immediate pain; that is, the immediate effects of the current. In this class of cases, I am referring to getting rid of the original trouble, and not to anything of the immediate pain, or the immediate appearance of the skin about the puncture, at all. Of course I do get a difference in the appearance of the puncture, and all around the puncture, depending upon which pole I use; i. e., in most of them, but in some of them I do not. In some of them, in using the positive pole, the skin seems to be in a condition of positive anæsthesia, because I get positively no burning, and no pain, and nothing but the sharp pricking of it. In other cases I get the normal sensation fully.

In speaking of this, a case comes to mind just here—a painful case. A young woman, something like twenty-nine or thirty years of age, had an accident, was thrown out of a carriage and struck upon the shoulder and side of the head, and had a fracture of the clavicle, and also of the scapula, and a dislocation of the shoulder joint. She was well attended, I believe, at the time, and made a very good recovery, with a tendency, however, to a very severe pain, which I could never get any description of other than that it was a very severe pain, in the lower cervical region of the spine, and extending down the arm and into the palm of the hand, and more or less between these points.

Now, when it came to my notice, it had been existing for something like seven or eight years, during which time there had been hardly a day without a recurrence, once, twice, or three times, of this exceedingly severe, excruciating pain, which would last from one to two hours and then disappear.

She was a stenographer and typewriter, and the pain grew worse and worse, and made it utterly impossible for her to work. It got so for a time that she simply could not write with that hand at all without bringing on the pain. She used it in ordinary work about the house without bringing the pain on, although the pain would come—but it did not seem to be directly attributable to that. But any writing or using the typewriter would bring it on almost at once, and it would last for an hour or two, and then disappear.

Now, this case had been in the hospital at Cincinnati for three months at one time, under very excellent care, I am sure; it had been in a hospital at Louisville for some time, and at Louisville it was under electric treatment, and what seemed to be a very careful and conscientious electric treatment. She had been in a hospital at Chicago two different times, two different hospitals, and under the care of good men; she had been under the care at one time of Sanger Brown, for instance, who is one of the very best neurologists we have in Chicago, and who is a man that gives a great deal of attention to electro-therapeutics as well, and the case had been diagnosed as neuritis, it had been diagnosed as meningitis, spinal, with thickening of the meninges, and had been diagnosed in various ways.

After two or three months of as careful study as I could give this case, I became satisfied that I could not determine any pathological lesion; I became satisfied in my own mind that I could not determine that it was or ever had been a neuritis, or that there was any thickening of the meninges; and I had X-ray pictures made, but I could not find that there had ever been or was any dislocation of the joint, or any trouble of the spinal cord; nor could I find that there was any possibility of any pressure upon the course of the nerve trunks anywhere, or upon the plexuses, or interference with the action of them, anywhere, and, in fact, I was in a profound study as to whether it was a hysteria or a " what."

Well, I did not get sufficient evidence—collateral evidence —to warrant me in calling it hysteria, quite, and I finally was obliged to put it into the basket of " whats," which are really neuroses. When I do not know what a thing is in that line, I put it in that basket—and I think, maybe, I am not alone in doing that thing—and I call it a neurosis. I tried persistent treatment of all sorts for two years. At the beginning I studied my materia medica, and I studied it faithfully, and I tried remedies. Later on, among other things, I tried hypnosis, and succeeded in getting the patient into the cataleptic condition a good many times, and in making the proper suggestions—or at least I tried to make the proper suggestions. I made suggestions, at any rate, and I got a little temporary relief. Means of counter-irritation were applied. For nearly three months I tried the German method of needling of the back, and putting on an irritating oil along the whole length of the spine; and we got beautiful irritated points along there, the back was nicely tattooed, and it was sufficiently sore, and there was sufficient counter-irritation, surely; and this was carried down along the length of the arm, all to get relief from this one tremendous pain.

Finally, when the case had been under my care over two years, and she was not a bit better than she was when she came (and why she stayed with me I could not imagine, as I had not done her any good then), in desperation I commenced the electro-puncture, and in her case I used it over the spinal region, over the spinous processes, and with the negative pole on a wet sponge in the hand. I took in the course of the pain, and, while I did not get immediate relief of the pain, at the end of two weeks she was having a less number of attacks; at the end of four weeks she was having a still less number of attacks; and that is a year ago, and she has never had one since.

I gave her treatments every alternate day for about two months altogether, making about four punctures at each treatment. Now, perhaps it was suggestion—I do not know that it was not suggestion; I had tried other means of suggestion. The truth is that I do not know what I did, or what it was, but only know the fact.

Now, I spoke of having had cases of locomotor ataxia, which came to me as such, and which had been so diagnosticated, and I have not been able to find sufficient evidence to warrant me in saying sometimes that it was a genuine locomotor ataxia. In fact, I have been unable to find any positive evidence of any decided organic lesion whatever, and have been obliged to put them into this same basket of "whats"; and under this treatment I have had them recover promptly within three, four, five, or six months, with treatment twice a day; and so with a number of cases which I have put into this one basket.

Now, what it is I do, I do not know; whether it is suggestion, I do not know. I have wondered over it, and I cannot make it out. Of course the fact remains that I do not know what I have got underneath there. I cannot but believe that there is a pathology of some kind, but what it is I do not know.

Dr. Wm. H. King: I would like to speak to a point here, and I would like to ask why Dr. Aurand asked the question he did. There is a great difference in the scar with the two poles; but did you think that it was on account of the hysterical condition here?

Dr. Aurand: No, sir; but I have already noticed that in some instances the scar is a good deal larger in some patients than in others. It seems to produce a greater counter-irritation than in others; and I wondered if the immediate effects were not due in some cases to counter-irritation.

Dr. Wm. H. King: It has been suggested to me here while Dr. Delamater has been speaking: we know that the physiological effect produced by applying the electric current directly to the nerve is very much different from what it is when applied to the integument. We know that, when we apply a current to the skin directly over a nerve, we cannot produce the same physiological effects upon that nerve as we can when we apply the current directly to it. In fact, they are very different. Now, it has been suggested lately—the last two or three years—that this was not due to the diffusion of the current through the tissues, as it was formerly thought to be; that is, that when you applied it to the nerve you had it practically on the nerve, and when you applied it on the skin the current diffused itself through the system. It is thought that the difference was not due to that, but due to the fact that the current, when applied to the nerve directly, had a vibration which corresponded, or would correspond, to that of the nerve. That the nerve, rather, would correspond to the vibration of the electric current; and the reason why, when we put an electrode over a nerve and cause a vibration, and produce a momentary contraction, which then ceases, is because we change the vibration in that nerve, so that it has conformed itself to the vibration of the electric current, and consequently flows along in a perfectly natural way.

Now here Dr. Delamater introduces the electrode beneath the skin. There is no change there so far as the one electrode is concerned, at any rate, by passing through the skin, and there is no change in the vibration. So we get a uniformity with the current, or perhaps I should say with the vibration of the nerve, which has an entirely different effect; which has, as we know, a far more stimulating effect, and which has, as we also know, a greater effect in overcoming especially any resistance in that nerve. For instance, we can take a diseased nerve and we can apply an electric current over the surface of that, and we get no effect.

Now, here may be an explanation of this: it may be that by introducing that electrode underneath the skin we get decidedly more nerve effect, and decidedly more nerve-stimulating effect, and increase the number of vibrations, and increase the electric flow through that nerve; perhaps overcoming a little resistance, perhaps stimulating it up where it was below par, and cause the pain. I simply throw this out as a suggestion; and I believe that if it was thought on and worked over, and the history of the case and the way the case responded taken into consideration, it could be worked out.

Dr. Delamater: I am very glad Dr. King struck the vibration business. The vibration theory is more or less an adopted pet of mine. I believe very thoroughly in the nerve force being a form of vibration. I believe very thoroughly that, if we can ever find any means by which we shall be enabled to regulate the vibration of this nerve force over the nerve trunks, we shall be able to accomplish things we have never dreamed of. I have in my own mind a very strong suspicion that, for instance, in the painful case I spoke of, we had at the time of the injury such an interruption in the vibration of nerve force over the nerve trunks as to make it an irregular vibration instead of a regular vibration. I believe that in that case we no longer had a regular, rhythmic vibration over these nerve trunks in that particular line. I do not believe that they were lowered or increased any number continually, but that they were irregular, and different at different times, and that as a result we had the pain; and I believe in that case that the result was due to the, in some way, regulating or making rhythmic the vibrations. I had tried the Mortimer Granville method of vibration, and I tried it at exactly the same hour every day, and for the same time, and with the same amount of pressure, and otherwise I had used the utmost precaution to have the nerve vibration used exactly as it should be, but without results. Yet my own impression is that in the regulation of the vibration in all this class of cases is the cause of my good results, and I am very much obliged to Dr. King for starting this subject.

STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

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CHAPTER X.

THE PAINFUL NEUROSES.

Diseases of the nervous system characterized by pain may be due to (1) inflammatory conditions, as neuritis, or (2) arise from affections of the central nervous system, as tabes, or (3) as a symptom of malnutrition, or chronic poisoning, occurring with various cachexias, or (4) from reflex causes and from extreme exhaustion, as neuralgia.

Most of these painful neuroses can be relieved, and the larger part of them cured, by static applications, when they have not become too chronic, or if some internal organic lesion is not present to preclude the possibility. The greatest obstacle to successful treatment here, as in all cases, is the presence of a thick layer of fat betweeen the surface and the seat of the trouble. Deeply seated affections, as neuritis of the sacral plexus, or in a bony canal, as of the chronic cases of tic douloureux and cases of neuritis in regions where muscles are sensitive and contract under strong administration of the wave current, as of the branches of the brachial plexus in the arm and forearm, require special methods of application, *q. v.* Pathological conditions which interfere materially are the forms of sarcoma and carcinoma, tubercular disease of the bone or lymphatic glands, and various tumors pressing upon deep structures.

NEURITIS,

inflammatory in character, as the name implies, arises from exposures when from fatigue or a lowered state the reactions

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are below the standard; from strains or traumatisms, or from complicating inflammatory conditions, as rheumatism, rheumatoid arthritis, or Pott's disease of the spine.

Any nerve may become the site of neuritis. It occurs most commonly in the sciatic nerve, the brachial plexus, and facial nerve. Neuritis is the cause of many *so-called* neuralgias, and is also present as a complicating condition of other inflammatory affections.

SCIATICA

is perhaps the most common and intractable of the forms of neuritis, when treated by methods other than the static. The localities most commonly the seat of the inflammatory process are at the sacro-sciatic notch where the nerve emerges from the pelvis, in the popliteal space, and the branches distributed to the foot. Quite often cases are met where it is difficult at first to determine the location of the lesion. In these it will generally be located in the sacral plexus, or in the region of the cord, when the prognosis may be in doubt from the various pelvic conditions that may complicate the case.

The diagnosis of the site or extent of the sciatica, or of any neuritis except within the cavities of the body or bony canals of the head, is easily made by applying sparks or the brush discharge along the course of the nerve, noting the points at which the severe pain begins and ends, and at the same time comparing with the effect at corresponding points of the opposite side of the body. A spark over a nerve, especially at the motor points, is always painful, but when applied over a part of the nerve the seat of the neuritis, the pain is intense. When determining the extent of a neuritis, it is only necessary to watch the facial expression of the patient during the application to mark the limits of the inflammation, as we map it out with the sparks.

The *prognosis* of uncomplicated neuritis, when accessible, is most satisfactory.

The treatment will vary with the conditions of the case. In acute recent cases, when the patient is muscular and not too fat, the wave current is all that will be required to effect a complete cure in a few days; the more recent the case the shorter the time needed, other things being equal. In fat patients, and chronic cases, it will be necessary to make use of long sparks to obtain the desired result. Over the foot and leg, prolonged applications of the brush discharge will give satisfactory results. When employing the wave current, or one of the modified currents, select an electrode with reference to the capacity of the machine or current used, the extent of the lesion, and the tissues of the patient. It is an intense vibratory effect that is required, to which the affected nerve must be sensitive when but a small part of the possible current strength is employed, that it may be gradually increased until the sedation is complete, which will be determined by lengthening the spark-gap without increased pain. The electrode should rarely be larger than 4 x 4 inches, and under certain conditions, above referred to, it may be necessary to employ one of the desired currents, preferably the Leyden jar current shown in Fig. 14, in order to get the required intense vibratory local effect. When using this current, place the indifferent electrode upon the platform beneath the bare feet of the patient, or a large electrode upon the back, abdomen, or chest, where some indication may exist for its use.

At the beginning of each administration of whichever current, the electrode having been secured so that it will be firmly pressed to the affected spot, open the spark-gap to a point at which the patient can, without much discomfort, tolerate no more. As the sensation becomes less intense gradually lengthen the spark-gap, when, at the end of at least fifteen or twenty minutes, the sedation will be complete. If the result be satisfactory, there will often be little or no pain whatever for twenty-four hours. In such, a daily administration will effect a cure in a short time. In others the pain may return sooner, and require, for a few days, morning and evening treatments, after which the periods may be gradually lengthened. In other cases, especially those of three or more weeks' standing, the wave current will fail to produce the complete sedation required; in such long sparks should be applied directly to the affected nerve over the whole extent of the lesion. and they will, as a rule, accomplish the desired result. Test the effect by having the patient exercise the muscles in the vicinity of the affected nerve, by stepping off and on the platform, standing with the weight upon the affected leg, moving the body in various positions, etc. If it is found that the sparks are giving relief, persevere until it is complete. Others say that they have known cases to be aggravated by the sparks. The writer, however, in records of more than one hundred cases has found none but what sparks would partially relieve, and not one was aggravated. The brush discharge, or prolonged administration of the spray, may assist in relieving some who are not too fat, or the case too chronic; the latter invariably requiring sparks. *Bridging* is of the utmost importance, and, when properly observed, we are satisfied that every case of uncomplicated sciatica can be cured by one or another of the electro-static modalities.

NEURITIS WITHIN THE PELVIS

occurs so often as a complication of other conditions, due to pressure or inflammatory processes in that region, that it is important to exclude a possible Pott's disease, carcinoma, or other tumor before undertaking the case, and certainly before giving any but a most guarded prognosis. That these conditions may be satisfactorily treated when uncomplicated the writer's experience has led him to believe.

Cases which we have treated have been successfully managed by the use of the wave current. When the lesion is in the lumbar plexus, it will be discovered by the effect of the intense vibratory action of a powerful current (4 to 6 inch spark-gap) applied at the back over that region, producing a painful sensation along the course of distribution of branches of the obturator and crural nerves. To as far as possible localize the application we would employ the derived Leyden jar current (Fig. 14), placing the direct electrode (the one connected with the positive pole of the machine) over the lumbar plexus, and several smaller electrodes at the points at which the principal branches emerge from the pelvis, which will be indicated by the pain produced by the previous administration over the lumbar region. Connect these smaller electrodes together with strips of tin or connecting cords and then connect with the inner coating of the smallest Leyden jar, and ground the outer coating and the negative side of the machine; gradually increase the spark-gap until sedation is complete. This may require from twenty minutes to half an hour, and rarely less than fifteen minutes. The vibrations over the lesion, and the transmitted vibration from without along the branches of the plexus, and the electrical effects of the high potential currents, whatever they may be, certainly do relieve the congestion and cure the patient. The observance of *bridging*—observing the indicated frequency of administration—must be adhered to, as in the treatment of all conditions. The same general plan would apply to cord affections or neuritis of the sacral plexus.

BRACHIAL NEURITIS

differs in no essential characteristic from the conditions which have just been considered, and the principles of treatment are the same except when, in the branches which supply the arm and forearm, it is impossible to produce the necessary intense effects, because the contractions which are induced prevent the use of the required potential. It is necessary, therefore, to rely upon the *sparks, brush discharge, or spray.* Sparks, 1 1-2 to 3 inches in length, must then be administered directly over the inflamed and painful portion of the nerve. The great relief which follows these severe applications encourages the most timid patients to endure them. During the course of the application the patient should move the arm about, making all movements that cause pain; at the same time indicating such as are painful and the points to which sparks give relief. Let the operator bear in mind that the motor points and bony prominences are always painful to sparks, and that to the latter they do no good, and to the former only when the nerve at that point is a seat of neuritis, and much needless suffering from a superfluity of sparks will be spared the patient.

With patients who do not bear sparks well, it may be possible, in the first stages, to cure those in whom the nerve is not covered with thick muscles or fat, by using the brush discharge or the spray during each administration, until the pain is relieved. When pain on movement is thus relieved it is always fair to suppose, in any inflammatory condition, the congestion is lessened; but experience with each case, noting the length of duration of the cessation of pain, will be a guide to the degree of effect upon the inflammation. If the relief is for but one or two hours, the next administration should be continued until a marked rubefacient effect is produced over a considerable area; failing in this, induce the patient to submit to sparks, which will succeed. The rubefacient action of the brush discharge is valuable in all cases of brachial neuritis, when the necessary time to produce it can be spared.

Neuritis in various other regions requires the same general plan of treatment as in the preceding special cases. *Facial neuritis* will be considered with the neuralgias, because it is generally so classified.

LOCOMOTOR ATAXIA

is a disease characterized by a degeneration of the central and peripheral sensory nervous system.

The ætiology is obscure, no certain cause being traceable in most of the cases. The fact that many patients present a syphilitic history has induced some writers to consider it the specific cause. Such observers, however, are largely in the minority. The position is taken by Gowers, " that there is nothing in the histological character of the lesion that can be compared with the morbid processes that are certainly syphilitic." " There is nothing, therefore, to warrant the opinion that any morbid germs deposited in the cord or nerves lead to the development of the disease." " It is probable that syphilis leaves behind it a predisposition to nerve degeneration, lowers in certain nerve elements the capacity for resisting morbid influences, leaves many patients in a condition analogous to one who inherits a predisposition to neural disease." Great diversity of opinion exists as to the percentage in which a syphilitic history *can* be traced. Some place it as low as forty per cent. and others as high as seventy-five per cent. It evidently does create a predisposition, but is not the cause *ipso facto*. The same conditions which may be attributed to syphilis are produced by other exhausting and enervating causes, as accidents (particularly concussion of the spine), exposure to cold, fatigue, exhausting diseases, excess of venery, and many others.

The pathology of the disease is characteristic. Cerebral centers are but slightly affected, while the centers in the cord, generally most marked in the lumbar region, are largely the seat of trouble.

Evidences of inflammatory processes, so generally absent in congestive conditions after death, are indicated by changes in the blood vessels (thickening of their walls) and overgrowth of the neuroglia which lies between and supports the ganglionic cells. The primary changes seem to take place in the ganglionic cells, which become atrophied or disappear, to be replaced by connective tissue. It is most probable that the lesion is of a congestive or inflammatory nature associated with a lowered constitutional state and marked by varying degrees of activity, the results of which are to be found only after death (pressure destroying and impairing the functional activity of the cells), but of a type favorable to the growth of connective tissue.

The symptoms, briefly considered, that are characteristic, are the pains; which vary from mild pains, apt in the first stage to be mistaken for neuralgia, to the severe boring and lancinating pains, the ataxic walk, girdle sensations, Argyll Robertson pupil, areas of anæsthesia, abolished reflexes, impaired function of the rectal, vesical, and sexual apparatus, and joint and tissue degeneration. Several of these symptoms are more or less constant in every case, and most of them occur at one time or another with sufferers in whom the disease runs an uninterrupted course. In no disease are the symptoms so variable and unaccountable as in tabes dorsalis.

The prognosis is variable; depending upon the stage of the disease, the severity of the lesion, the physical condition of the patient, and the character and frequency of the treatments. We believe that, in patients not afflicted with other organic disease, it can be stopped in its progress and many of the symptoms be decidedly relieved, and that in the first stages it can be generally cured; only conditions referable to irreparable or destroyed cells remaining.

Treatment of locomotor ataxia must meet at least three indications—the improvement of the general status, the arrest of the processes, and the relief of symptoms.

(1) If degeneration is the primitive condition, and the cause not a specific organism, but a lowered vital state, especially of the nervous system, the indication for treatment is the employment of means of restoration or regeneration.

(2) The inflammatory processes which are undoubtedly present and productive of destruction or atrophy of the ganglion cells, either by the pressure present in congested tissue, or by the action of the inflammatory process attacking the cell protoplasm itself, must be interrupted if the local lesion is to be arrested.

(3) The treatment which arrests the lesion will relieve the symptoms to some extent, and the electrical treatment, when applied to the symptoms in the manner to be described, creates by " ingoing impression," as shown by Morton, a return at least partial to activity of many centers, even during the administration.

Electrical treatment has for a long time been recognized by medical electrologists to possess merit in the treatment of tabes, but neurologists generally prescribe it only as they do the iodides. The fact is that favorable results can only be obtained from electrical treatment with a devotion to technique, which must be directed to the conditions, and time at each administration sufficient to obtain the desired effect, and a frequency of administration which will bridge over the gains. Observing these measures, *electro-static* treatment, at least, will meet many indications, and generally prove satisfactory to both physician and patient.

Ganglion cells that have been destroyed cannot be replaced or regenerated in any case. The patient must, therefore, be made to understand that restoration, other things being equal, will be relative to the number of cells destroyed, and the condition and surroundings of the cells impaired, which are unknown.

The *first indication* is met with possibly the judicious use of tonics and attention to diet, together with twenty to thirty minutes' administration of the wave current. The effects of tonic static administrations upon all nutritional derangements are energizing and restorative; evidenced, as has been shown in the preceding chapters, by improvement in appetite, nutrition, and activity of every body function. Such are the effects in all cases with locomotor ataxia patients not affected with other organic disease. No special administration of the wave current will be necessary when the local use is for a long enough period of time, and employing sufficient voltage, to insure the required effect.

The second indication to be met, the relief of the inflammatory characteristics of the lesion, is not only demonstrated to be relieved, but the fact that such lesion exists, if other evidence was not adducible, is also demonstrated; or else some other reasonable theory must be presented for the restoration of the functions, which does take place in so many patients that the results seem to be confirmatory.

The removal of the pressure from the ganglion cells, by withdrawal of the congestion, would permit a general restoration of their function, to a greater or less degree; while a theory of regeneration, or the substitution of new ganglion cells, would be contrary to fact. When it is so certainly a fact that congestion is removed from the deep structures of a knee or hip joint by static administration, it is not presumption to expect that the same thing will take place within the spinal cord. Certainly, no other fact will explain the relief afforded cases of anterior polio-myelitis, to be reported in a subsequent chapter.

For relief of the cord affection, place over the region or regions affected, a sheet-tin electrode three inches wide by eight inches long, and secure it firmly by placing a pillow against the patient's back; connect with the positive pole of the static machine, and administer the wave current, employing a spark-gap of four to six inches in length for at least fifteen minutes; and follow this with the same administration to the soles of the feet, for the same length of time. Another method is to employ the current shown in Fig. 14, chapter VI. Connect the electrode applied to the back with the positive pole of the machine, and the one beneath the feet to the Leyden jar, and regulate the spark-gap to the sensations of the patient. When the latter plan is adopted, it will be best to close the current administration by disconnecting the rheophore from the Leyden jar, and making use of the wave current as first directed for fifteen minutes, for the tonic effects of the derived current are but moderate. Long sparks over the lumbar region are undoubtedly useful in relieving the central congestion in all cases. Such are especially indicated in very muscular or corpulent persons.

The third indication, the symptomatic, is of great importance, and contributes no small amount to the relief of the central lesion and the awakening of the liberated, but dormant, cells.

(a) *The pain*, the most distressing symptom of tabes, yields satisfactorily in almost every case to one or another of the modalities. Patients who were taking many grains of morphine daily for relief have, to the writer's knowledge, been able to abandon the drug altogether after a few weeks' treatment. The wave current, sparks, and the brush discharge have each given temporary relief when locally applied: one modality gives greater relief to one case, and others derive more benefit from another. The greatest measure of relief from this symptom, as from all others, is derived from the general and direct spinal application.

The Argyll Robertson pupil and other optic symptoms, when once present, have never been benefited by treatment in the writer's experience, nor in cases in records examined.

The areas of anæsthesia are easily discovered and outlined by passing the brass ball (the patient connected and the machine moving at moderate speed) over the patient's clothing.

The friction spark rapidly applied to such areas, at first imperceptible, causes after a short time a feeling of warmth, and later, in the most hopeful cases, becomes intolerable. It is the treatment *par excellence* for this condition, and at the same time contributes very largely to relief and reawakening of the function of the remaining ganglion cells. The effect is certainly significant when patients who had not been able to feel one foot with the other in bed for two years are again able to do so, and gradually begin to maintain permanently a much improved, though not normal condition.

In the first stage, in most cases, the sensation may be restored to normal, because no cells have been destroyed, but their functions impaired. The administration should be made very thoroughly to such areas, and at each administration to the lower extremities and body as well. In a few cases the upper extremities are involved, and must then be included in the attentions given.

The ataxic walk is caused by the anæsthesia, and is improved, as a rule, in proportion as the normal sensation is restored.

The abolished reflexes are rarely, if ever, restored by any treatment.

The *impaired vesical, rectal,* and *sexual functions* may each be greatly benefited by the stimulating effects of the wave current applied within the urethra, bladder, and rectum, and friction sparks above the pubes, and to the penis and perineum.

To the *tissue* and *joint degeneration* we would administer the brush discharge.

EPITOMES.

TREATMENT FOR VICTIMS OF ELECTRIC SHOCKS; AS OFFICIALLY PROMULGATED BY THE POLICE DEPARTMENT OF PARIS, FRANCE.

I. Whenever a person is injured by the falling down of, or from contact with, an electric wire, those present must not under any circumstances touch the electric wire with their hands.

II. It is important to release the victim from the wire as soon as possible, and a piece of dry wood (broomstick, for example) will serve the purpose. This should be done with the greatest precaution. With the same piece of wood the wire can then be pushed aside, if it obstructs the way.

III. The central power house, through the nearest telephone or police station, should then be notified to stop the current, and the nearest physician called, who will treat the patient similarly to a drowned person.

The following recommendations should be given the widest publicity and be attached to the electric supply-posts and all places where the accidental falling of an electric wire can cause injury. Although the instructions state that the physician will treat the patient like a drowned person, the bystanders need not await the arrival of the doctor before giving assistance to the stunned patient. It is, therefore, wise to publish the methods for aiding such cases as recommended by the Conseil d'Hygiène et de Salubrité du Département de la Seine.

The accident is removed from the place of accident, the neck and chest freed, and resuscitation is then attempted by any of the following methods:

(a) Rhythmical Traction of the Tongue; (b) Artificial Respiration.

It is best, if possible, to combine the two methods.

(a) Rhythmical Traction of the Tongue.—The manipulations should be commenced as soon as possible.

(1) The patient is placed on the back; the head slightly turned to one side.

(2) The jaws are opened; separating them by force, if necessary.

(3) The tongue is seized between the thumb and index finger with a handkerchief or cloth.

(4) The tongue is forcibly drawn out of the mouth, repeating twenty times per minute. Do not be afraid to draw it out too strongly; it is necessary that at each traction the jaws be opened wide, and that the tongue protrudes entirely beyond the mouth.

(5) These movements of traction of the tongue should be continued with persistence for at least one hour.

N. B. If the operator becomes confused by the number of tractions, he can regulate the number by his own respiration and perform traction on the tongue of the patient with each respiration of his own.

The appearance of hiccough or vomiting is a favorable sign; when it occurs, it is necessary to continue the tractions on the tongue for a long time.

(b) Artificial Respiration.—The patient is placed on his back, the shoulders slightly elevated, the mouth opened, and the tongue well drawn out. The following methods are employed:

(1) The arm of the patient is grasped at the elbow and brought firmly against the side of the thorax. Then the elbows are moved upward above the head, describing the arc of a circle, and lastly bring them back to their first position and press firmly against the side of the thorax. Repeat these movements about twenty times per minute, and continue until respiration is re-established.

(2) Place the hands flat upon the inferior and lateral parts of the thorax, using vigorous pressure, and letting go immediately after the pressure. Repeat these movements about twenty times per minute; continuing same until normal respiration supervenes.

These methods, while probably well known to many practitioners, should receive wide circulation, and the Paris authorities, emulated by those of other municipalities, as proper public knowledge of the above technique will no doubt save many lives.—W. H. Dieffenbach.

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THE TREATMENT OF HEMORRHOIDS AND FISSURES OF THE ANUS BY CURRENTS OF HIGH TENSION AND HIGH FREQUENCY.

M. Schdanoff in Gazette des Hôpit. de Botkin, 1900, No. 30.

The author has applied the high-frequency and high-tension currents in almost one hundred cases of hemorrhoids and anal fissures, with uniform success. He employs the bipolar method with séances of only five minutes' duration. After the first treatment, in many cases, the pains moderate and hemorrhages diminish. About ten treatments are necessary, one every other day, to arrest the bleeding completely. After twenty séances the spasms of sphincter ani and the constipation disappear, and the fissures become cicatrized; the general condition of the patient being markedly ameliorated, so that in a short while the cure is complete.

It seems quite evident that currents of high tension and high frequency are destined to supplant surgical procedures in the treatment of hemorrhoids and anal fissures; the treatments being more rational, less painful, and more lasting than operative surgical interferences.

The author attributes the curative action of these currents, in the treatment of hemorrhoids and the cure of spasms of sphincter ani, to the re-establishment of the caliber and tone of the hemorrhoidal veins and the removal, through stimulus, of the venous stasis of the parts affected.

* * *

TREATMENT OF CONSTIPATION BY THE SINUSOIDAL CURRENT.

In an article on the treatment of constipation Sajous Monthly mentions the use of the sinusoidal current, especially where there is enteroptosis due to relaxed abdominal muscles. After replacement of the viscera, the application of the slow sinusoidal current to the abdominal muscles produces results which cannot be accomplished by any form of passive exercise.

By means of a rectal electrode introduced into the rectum and a pad electrode placed over the abdomen, the musculature of the lower portion of the alimentary canal can be gently exercised by the rapid sinusoidal current. This form of treatment gives most excellent results in those cases in which there is a semi-paralyzed condition of the musculature of the rectum, due to the failure on the part of the patient regularly to evacuate the bowel.

* * *

ELECTRICITY AT THE WORLD'S FAIR.

A novel and interesting suggestion for a building of glass with steel framing, in which to display electrical exhibits, is before the Committee on Electricity of the World's Fair to be held in St. Louis in 1903.

The idea has been elaborated by Mr. Edson Brace, a man of scientific attainments, formerly connected with the Patent Office at Washington. Mr. Brace writes as follows:

" I beg to suggest the construction of a building for the display and illustration of electrical and therapeutic exhibits, to be composed wholly of glass with steel framing. The prime idea would be complete insulation electrically from the earth, which would make possible many novel and curious results, due to atmosphere of captive electricity purely stationary in quality and thus not productive of the violent action of currents with a circuit or earth connection.

" It is a fact already well known in electro-therapeutical science—though not developed beyond the stage of experiment, owing to the difficulty of establishing the required physical conditions—that simple saturation of the human body with magnetism, produced by the ordinary electric method, exerts upon the subject an influence of singular buoyancy and felicity, which is believed by progressive investigators in this new field to embody possibilities in the treatment of human maladies of the most startling character. Practical electricians will assert, almost without exception, that the movement of the magnetic element is an essential to the saturation of any object therewith, as by a current with the earth or a metallic circuit connection; but such people, in the light of successful experiment, have yet something to learn in their own special field.

" It is possible to introduce electro-magnetism into an insulated chamber, and, as I believe, into a building of large proportions, by single-pole projection or conduct, and thereby to completely saturate such chamber or building and every object therein, living or inanimate, with this subtle and vivifying element of nature which no man is wise enough to define (though some have sought to classify its variations), and which is believed by sagacious investigators to be laden with such noble possibilities in the alleviation of human ills.

" At one time, in course of my service of some years in the United States Patent Office, I witnessed an experiment in this line under charge of Professor Charles Hedrick. A cat was subjected to a moderately strong current from an electro-magnetic battery, and from the instant of contact the animal exhibited the effects of pain and fear in a most active and distressing manner. The cat was then transferred to a large glass jar, which had been brought by Professor Spencer F. Baird, and the jar was subjected to the one-pole induction of the same battery, precisely as the Leyden jar is primed or as the motor of an automobile is charged. The animal was now completely at ease. Every hair on its body seemed to stand out as the quills on the porcupine; its tail was enormously enlarged by the same means, its eyes alternately expanded and contracted with the varying sensations of the electrical inflow, and when touched it purred contentedly and gave evidence of apparently the greatest felicity of which its species is capable. At first the animal had been shocked by a flowing current; in the second instance, it had been saturated by the magnetic element in suspension, restricted in movement by the jar's insulation. All present were impressed with the sense that there was an object-lesson that some day would be utilized for the practical benefit of humanity; but the evolution of great ideas is ever sluggish, and people are sometimes indifferent to even their most precious interests until the shadows are overcome by some startling iridescence; until a chance lightning bolt from the infinite rends the fabric of accustomed thought, of settled habit.

" To develop this idea for the Fair, a glass foundation is essential. The superstructure is immaterial, but it would be most appropriate to carry out the glass plan throughout. It is wholly feasible; the expense would be but little, if any, in excess of that of an ordinary modern building of its size. The glass should be made permanent. It would practically illustrate glass as a building material—and there are even now many geniuses, not classed with poets and fools, who believe that this has a future of no inconsiderable importance. We have known for years that men who work about power houses are soon freed from rheumatic and nervous ailments; that in New York there is authentic record of surprising curative results due to this association. These things are full of prescience.

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TREATMENT OF CATARRHAL DEAFNESS BY ELECTROLYSIS OF THE EUSTACHIAN TUBES.

Dr. Dunbar Roy, in the Atlanta Journal-Record of Medicine, discusses the above subject. He says that such condition annoys the patient, because of its attendant discomforts, such as noises, inability to listen to conversations, etc.

Any new method of treatment holds out great hope because, in many of these cases so far, we have been unable to do much for them. Deafness, he states, is a symptom, and in no wise informs us from what it comes. However, it is a well-known fact to otologists that the majority of cases of progressive deafness come from a catarrhal condition of the eustachian tube and the naso-pharynx. It is in this class of cases that he particularly speaks of in the matter of treatment.

He says the old idea of inflating the middle ear with the Politzer bag for the cure of chronic deafness is obsolete, and should be relegated to the Middle Ages. In many cases of chronic catarrhal deafness, the eustachian tube is strictured, and it is with difficulty that the air can be forced into the middle ear; hence the tight feeling in the ears and frequent tinnitus.

On the other hand, there are cases in which the tube is thoroughly papulous, as, for instance, in the atrophic form, where the mucous membrane is more or less sclerosed. The important thing to decide is the condition of the lumen of the eustachian tube. Since in the large majority of cases stenosis is the rule, our endeavors will be directed to opening this permanently strictured condition.

When we remember that the mucous membrane of the lumen of the tube lies practically in contact, we can readily understand how easy it is for any slight thickening of this membrane to produce a change in the atmospheric pressure within the middle ear. The effect of such stenosis of the tube is to produce a retraction of the drum membrane through lessened internal pressure. This, continuing for any length of time, produces a more or less permanent retraction.

The subject of the general treatment of catarrhal deafness is too broad to go into with this paper.

To determine whether the tube is patulous, there are two methods. The first and most satisfactory method is that of auscultation. The second is that of the passage of the eustachian bougie. Now since, in every eight out of ten cases of catarrhal deafness, the eustachian tube is more or less closed, our main endeavors will naturally be in trying to restore its potency. Aurists well know that in cases where deafness is largely due to closure of the eustachian tube, that even then there are other conditions with which we must contend; such, for instance, as thickening of the drum, partial immobility of the ossicles, thickening of the openings leading into the internal ear, all of which by their presence impede very much the successful issue of treating catarrhal deafness.

Now if we can remove the strictured condition of the eustachian tube, we will have accomplished much, if not in restoration, at least in a marked benefit to the hearing power of the patient. To accomplish this end, we have for a long time used inflations. This does good in many cases, but often fails.

Some two years ago Dr. Duel of New York called attention to the treatment of stricture of the eustachian tube by means of electrolysis, having devised some copper bougies of various sizes, through which the current was passed. During the last two years the writer states that he has used this method in probably a dozen cases, and, on the whole, with most satisfactory results. He does not use it in all cases of catarrhal deafness, from the simple fact that all cases do not have stricture from the eustachian tube. In such cases he first finds out whether the lumen of the eustachian tube is free by using the catheter or auscultation tube. Also on the first examination he injects a solution of suprarenal extract into the tube, in order to contract the mucous membrane, thus showing whether the stricture is true or false. The latter name implies those cases of stricture due to temporary swelling of the mucous membrane. Having found out what the condition of the tube is, he treats it with vapors and liquid medicaments for at least a week, and if there is then no improvement, and the auscultation tube shows strictured condition, he resorts to the use of rapid dilatation by means of electrolysis. He uses the bougies devised by Duel, which consists of copper bougies, varying from No. 3 to No. 6 (French scale), securely mounted on No. 5 piano wire. He always starts with the smallest and increases the size after a few days' treatment. The bougies are passed through the catheters until the bulbous end is just seen at the opening. The catheter is now inserted in the mouth of the eustachian tube. To the fore end of the wire standing from the catheter a handle is attached, which in turn is attached to the negative pole of the galvanic battery by means of the chord attachment. The positive pole is an ordinary sponge electrode, and is held in the patient's hand. The current is now turned on until the milliamperemeter registers 5 ma. The bougie is now passed on into the lumen of the eustachian tube, and when it reaches the stricture he waits a few minutes for the electric action, and then by gentle pressure the stricture is usually passed and the bougie continued into the tympanic cavity. The latter is very necessary to learn by measuring beforehand how much of the free end of this wire must remain exposed, so that the other end will be into the tympanic cavity. He uses sometimes as high as 8 to 10 ma., although Duel says he never uses more than 5 ma. He always uses a pure silver catheter, and insulates it by wrapping with gutta-percha sheeting. The battery he uses is an ordinary dry-cell chloride of silver battery with thirty-two cells. It is absolutely necessary to have a milliamperemeter. It takes quite a little knack and practice to use successfully these bougies, for a lack of skill will frequently do harm. One precaution necessary is to never inflate an ear immediately after the bougie, for fear of emphysema. It is remarkable, sometimes, to see how much benefited a patient will be, after even one treatment. The hearing is improved, and especially is the tinnitus relieved. The electrolysis is used about twice a week, and between times the mucous membrane of the eustachian tube and tympanic cavity is thoroughly medicated.

In conclusion he says that this is "no absolute sure method," for such has yet to be found, but the results attained by him so far warrant the assertion that it is superior to all other treatment yet devised.

—The eleventh annual convention of the American Electro-Therapeutic Association will be held in Buffalo, on September 24, 25, and 26, 1901.

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A MODIFIED WAVE CURRENT APPLIED BY ELECTRODES OF HIGH RESISTANCE.

BY THEO. C. WIGGINS, M. D.

Are all the possibilities of the static machine fully known by anyone? Probably not, and it may be that valuable properties of this form of electricity are yet to be discovered.

A great advance was made in electro-therapeutics when Dr. W. J. Morton introduced the static wave to the profession. We see and hear of devices for transforming static electricity, to raise its potential, by which new effects are secured.

This paper is presented to call attention to a simple manner of modifying and adding new features to the static wave, which promises to be of value.

For over two years the writer has been working with a current of high potential and fairly high frequency; using glass vacuum electrodes of various shapes, intended for the eye, ear, nose, mouth, rectum, vagina; tubes for holding in the hand, and hammer-like electrodes for general application.

When in use the electrodes would be illumined with various shades of violet, depending upon the degree of vacuum in the tube, and also upon the strength of the current. The charged tube, if now held in the hand, would feel like a plain tube of glass; only, if the current were quite strong, there would be a slight sense of warmth in the hand, and one would be surprised at finding that another such tube, brought in contact with the body, would also be lighted; and if any person touched him anywhere, each would receive a sharp sting from the resulting spark.

This form of electricity, applied locally, has brought about some very gratifying results in many varieties of troubles. An electrician, Mr. R. G. Brown, said that he had obtained the same beautiful violet in such tubes by connecting them with the static machine.

The being called upon to furnish a paper for this session of the society was the incentive needed to begin experimenting along this line. It was soon seen that Mr. Brown might have gotten his results from arranging the sliding rods as for the static wave.

Here are three of the rules laid down by Dr. W. B. Snow for administering the wave current:

" I. Ground one pole of the machine to a gas or water pipe, or other direct metallic ground connection.

" II. Connect the patient by conducting cord to the side of the machine not grounded.

" III. Close, or nearly close, the discharging rods and start the machine. Gradually separate the discharging rods as may be required."

Attaching a vacuum tube to the ungrounded pole and being seated on the insulated platform, holding the tube in one hand, the machine was started and the light came into the tube, increasing in depth of color as the poles were separated and the speed of the machine increased. A tube was taken in the free hand, and that also became luminous. A strong odor of ozone was left upon each hand.

Next a metal electrode was attached to the machine and held in one hand and a vacuum tube in the other, as before. This time it was seen that the tube was more brilliantly lighted than before, and that the muscular contractions in the wrist and hand holding the metal electrode were more violent than when it held the vacuum tube, the current in the latter case being more diffuse.

Similar results were obtained when standing on the floor, except that the current was not as strong. The same experiments were then made, removing the ground connection from the other pole of the machine, and the current was still more modified. So far, the experiment showed that the current from the static was quite similar to the high-potential current above referred to. It did not have the volume, gave pain when applied over the frontal sinuses, and produced muscular contraction; neither of which were noticeable with the better-known current. Patients were now induced to submit to experimentation, and the reports were gratifying in almost every case, but not enough people have been so treated, and their progress noted, to make a detailed account of much value.

Frequently electrodes have been introduced into the vagina or rectum and another applied to painful parts of the body, as over a tender ovary, a lame back, or upon any place that might be benefited. The applied electrodes might be connected with the earth direct, or grounded to the floor by a chain, or by the operator holding in the hand the end of the wire coming from the electrode. This case will illustrate: A patient who has chronic induration of the cervix came in recently, with a distressing attack of laryngitis. Having gained her consent to be experimented upon, she was placed upon a couch, which was not insulated. First a metal electrode was inserted into the vagina and connected with the machine, then a vacuum electrode was inserted. During these two tests a general electrode was applied, labile, to the neck over the larynx, a chain leading from the electrode to the floor; then a tube was applied to the neck directly from the machine, and, finally, block tin was tied over the larynx and connected with the machine. The poles were separated alike in each case. The following is the report by the patient of the different experiments:

A. Metallic electrode in vagina: no sensation to patient. Vacuum electrode on throat: current strong and pleasant.

B. Vacuum tube in vagina: sense of heat and some pulsation. Vacuum electrode on throat: current not as strong as " A."

C. Vacuum electrode on throat alone: muscular contraction with tingling—current strongest.

D. Tin on throat alone: heat and fine, pricking sensation—uncomfortable.

This was probably due to failure to moisten the skin under the metal.

"A" was declared to be most satisfactory by patient. The hoarseness was diminished and the larynx felt more comfortable.

Another time a school-teacher, who was in danger of breaking down, came for more of the help which electricity always afforded her. Her face was scarred from acne, and there were some bad spots upon it. For a general tonic effect, the metallic electrode was introduced into the vagina and a vacuum electrode was passed thoroughly over the face. This time the tube was connected with the earth, and again with the floor only. The patient did not note any difference in sensation, but the speed of the machine had to be greater to keep the same shade of light in the tube when connected with the earth. The teacher was gratified with the lifelike feeling in her face after the treatment. In another instance a tin strip was applied to the spine and the tube electrode used over an enlarged thyroid, which has been growing smaller from treatment with the other current. The patient thought the treatments quite the same.

The vacuum electrodes above referred to are patented and are not on the market. It is a question if effects derived from a Geissler tube can be controlled by any patent. Certainly electrodes of different shapes and construction are to be purchased or made as ordered; but one is not confined to such electrodes. The same effects can be produced by passing the static wave through metal electrodes of any shape, if covered with rubber; also, by putting a wire in a glass tube and connecting the wire with the machine. Other substances that present high resistance to the passage of the current will produce the same results.

One factor which may prove of great value is that ozone is given off by these electrodes at point of contact. Why may this not prove of service in treating urethritis or cystitis?

Into a catheter insert a wire, pass the catheter as far as necessary, connect the wire with the machine, and soon the bladder or canal is filled with ozone. Oxidation takes place elsewhere, and there is good reason to believe that the same is true on mucous surfaces. Nasal catarrh has responded to such treatment in a very few minutes—credit is due to the relieved congestion because of the current; but probably the antiseptic property of the ozone is a very important factor in the case.

The writer regrets that these investigations were not more exhaustive and the results more positive; but it is hoped that others will go on with the experiments and, if there is merit in any of these observations, that they will be fully developed.

12 Verona Place, Brooklyn, N. Y.

DISCUSSION.

Dr. William H. King: This opens up a very nice field for discussion. One point I should criticise at the outset. The static wave current is applied in a certain way. It is applied by putting the patient on a solid platform, grounding the one pole, and attaching the patient to the other pole of the battery. Now, if one pole is thoroughly grounded, say the negative pole, and you attach the patient to the other pole, and you separate those poles one inch, you practically have there an electro-motive force of 50,000 volts; that is, as near as it can be estimated. Now, you set your machine going. The patient on the platform is simply a continuation of that pole, and if it requires 50,000 volts to cause a spark to pass over one inch, the patient gets his share of the 50,000 volts. If you separate the poles two inches and the same ratio holds good, he is a part and parcel of that pole, and he gets his share of the 100,000 electro-motor volts, about, that pass through. Now there you get a direct discharge of his pro rata share of the voltage, according to the distance the spark is. Now, that is where the metal electrode is applied; but with Dr. Wiggins' arrangements, and a vacuum electrode, a different arrangement takes place. There you charge the metallic matter on the inside of this tube, it induces a charge on the outside, and it also induces a charge in the patient, the same as in a Leyden jar, and you get there an induced charge in the patient instead of a direct charge. It must be so, because the glass will not conduct the electricity. In the one case you get the direct current from the metal electrode, and in the other you get an induced charge, and there must be a neutralizing of the positive and negative charges here.

Now, here is a new form of current. It is not a wave current. But here you get a static induced current, different from the static induced current as it is generally known, which is a misnomer—we get here an induced current, the same as we get with a high frequency, except that it is an oscillating and not an alternating current, and it undoubtedly has fields of its own, and has opportunities of its own; but it is not a static wave current, but an entirely different current altogether, and entirely different in its action on the system.

Dr. Livingston: I quite agree with Dr. Wm. Harvey King with regard to this current. It is not regularly the Morton wave current.

I think Dr. Wiggins' observation on the illumination of the vacuum electrodes will clearly define the polarity. There will be a marked difference in the color at the two ends, so that it will reveal to us the fact that the current is uni-directional or oscillating. The current has a natural uni-direction. If we take a static machine, with a connected Geissler tube, we can readily determine which is the positive and which the negative pole of the machine, by the fact that the positive pole is pink or red, and the negative is blue or violet. Now, when we connect the same machine up with condensing jars, and connect the tube to the outsides, we find that the vacuum tube fluoresces at each end, with the same rate at each end; that is, each bulb is full of fluorescence, while, if we take a tube joined to one pole of the machine, we have but one fluorescence —at the negative.

The character of the current, consequently, must be distinctly different from the Morton wave current. There is no similarity.

Dr. Wiggins: I have had no one to consult with in regard to the title of this paper, but as I got the current in the same way as the Morton wave is generated, I thought I had just a modification of that wave. There is one thing which I think is quite important, and that is the ability to get a local effect in a point remote from the place where the metallic electrode is applied; and I should like very much to have this thing investigated, and if there is anything in it which compares with the current I have been working with, I am sure that just that factor is a very important thing, because I have seen the local effects of these electrodes with this current I have been working with; I have seen things disappear in a very wonderful way. I remember one case of serious inflammation, which was the result of a very serious case of peritonitis. The roof of the vagina was like a board, and you could not outline anything. The patient had been suffering for eight weeks. I had had experience with her some time before, and had seen her improve under the high-tension faradic current, but this attack was not influenced by anything; and with the local application of this current in the vagina,—one electrode in the vagina and the other over the abdomen,—I brought immediate relief, and I think it was less than two weeks when I could outline the uterus, and the inflammation and exudation had disappeared to a great degree. And if we can with a simple device like this bring about any such results with the static current, I think we have something that we can rejoice over.

The modification or the passing of the static electricity through the Leyden jars may bring about better effects, but this promises considerable, I think.

Dr. W. H. King: " Static induced current," I think, would be a proper name for this new current. " Static induced current," as we now apply it, is a misnomer. It is not really that; but I think that this is really a static induced current.

Mr. T. F. Livingston: I want to suggest the difference between what is known as the high-frequency current, high or rapid oscillating current, and the current used by Dr. Wiggins. The high or rapid oscillating current is practically a current devoid of pure polar direction. This current has an absolute polar direction. Now, there may be something in the effect, the therapeutic effect, of the rate of interruption plus the polar action, when applied.

I think this question of polarization is one that should be more carefully looked into than just simply to give it a name without attempting to distinguish between these different currents.

Dr. Wiggins: There is just one thing more, and I have just alluded to it, and that is the fact that you can get these same results through ordinary glass, or by covering the electrodes with rubber. Just so long as you bring about insulation, the vacuum is not essential.

Dr. William H. King: You will get a little stronger results if you use a piece of pure glass and tin foil, and connect the machine with the inside, so that the metal comes in contact with the tin foil.

Dr. Dieffenbach: I would like to ask Dr. Wiggins, if this current gives off ozone as he thinks it does, if he has used it in conditions such as ozena and rhinitis; and if it has given any results showing a germicidal action.

Dr. Wiggins: I have not noticed any such thing, but I have found the trouble disappear.

Dr. William H. King: I would say that it does give off ozone. If you put the electrode on the forehead, and then remove it and put the hand to the forehead, you will find that it smells quite strong of it.

Dr. E. S. Bailey: I cannot help but remark on one thing in this connection; the Doctor having presented his paper in the modest way he did, by saying "if such and such an experiment is interesting." To my mind it would be a very sorry day for electro-therapeutics if we could say that all experiments could cease now, we know it all; and the very fact that a series of experiments can be made and a negative result produced is a positive good. Here a positive result is produced, and therefore it is of the greatest service. All these things in the line of progress are of service. Let us keep them up, and compliment everyone for doing his share in the work. That is what we all want to do, and would be glad to do, if our time was not so much taken up in other ways.

If I may be permitted to add one more suggestion in this connection, it is as to the possibility of another covering to the glass to provoke a more thorough distribution of the current as presented to a moistened surface, and that is the susceptibility of the current to a condition in an even way by covering the glass with a gold-beater's skin, as a highly prepared agent, and as an agent subject to fewer changes—chemical changes—than any other I know of. It strikes me that an electrode with that covering—in fact I know from the experiments that have already been made and with which I am familiar, that this is bound to be adopted sometime, for modifying a very strong current, because of its high resistance, and too, it resists moisture to such an extent that it does not allow the flow of the current to take place at the weakest point of the electrode. The resistance is modified all over.

Dr. William H. King: It is an insulator?

Dr. E. S. Bailey: No, sir; not an insulator.

The Chairman: There is a good deal of resistance, you mean, but it is not an insulator?

Dr. E. S. Bailey: Yes.

Dr. Wm. H. King: When you have a metal-lined tube, and then you add this on the outside, it is just like a Leyden jar; you have practically a Leyden jar, complete.

You might get a good effect from this, but it is a different effect from that of a metal-lined tube without the coating.

Dr. Bailey: It is a good effect.

Dr. William H. King: But it is a different effect.

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STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

BY WILLIAM BENHAM SNOW, M. D.,

Late Instructor in Electro-Therapeutics and Nervous Diseases in the New York Post-Graduate Medical School and Hospital.

CHAPTER X.

(*Continued from page 253.*)

NEURALGIA,

another name for pain when applied to disease, has long been recognized as a misleading and unscientific term—classing a symptom as a disease. It can never be the correct thing to permit such professional license because an obscure or remote condition is difficult to diagnose. It is better to admit ignorance, and, when possible, find out the cause.

When a local pain is persistent, a local cause may be presumed to be present; in a few cases, however, the lesion will be found in the central nervous system, or at an injured point in the course of the nerve.

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The pains associated with adynamic conditions, such as the cachexias, anæmia, and chronic malarial poisoning, are never constant, but flitting, and demand the indicated constitutional treatment.

Reflex pains also are not constant, but vary with the condition of the organ from which they originate.

Treatment first calls for diagnosis of the cause, after which, treatment of the pain and as well of the condition which causes it. Perhaps it may now be said—not scientifically, but from the therapeutical standpoint—that the scientific administration of Franklinism makes the diagnosis less imperative, since it relieves the local pain and the local congestion which may cause it, and at the same time improves generally the adynamic condition. On the other hand, such treatment becomes an aid to diagnosis by exclusion—a condition not yielding will, as a rule, be due to an organic lesion, local or central.

For the relief of pain all of the static modalities possess merit. We place them, from our own experience, in the following order of preference: viz., wave current, brush discharge, sparks, breeze, spray, static insulation (nutritional), and static induced current. The first four meet all demands and will be treated according to special indications in the following pages.

COCCYGODYNIA

is due in most cases to either an arthritis or neuritis; both generally intractable to all but the electrical treatment. The constant and coil currents have achieved small success in this painful affection, and electricity has, therefore, also been rated a failure by many. The old currents are impotent because they do not relieve the local congestion which is always present in an arthritis or neuritis. We have demonstrated the static modalities to be successful in every case which has continued the treatment when the products of inflammation have not formed deposits which restrict motion. The prognosis is generally good, and the time necessary to effect a cure will depend upon the chronicity and extent of the injury.

The wave current will give satisfactory results when applied by adapting a tin electrode to the region, and after securing it employing the current in the manner in which we treat neuritis for from fifteen to twenty minutes. If a trace of pain remains, it may be removed, in most cases, with either the brush discharge or sparks; the former being indicated in acute cases associated with tenderness and possible ecchymosis resulting from an injury; and the latter in chronic cases, to promote the reabsorption of the products of inflammation.

INTERCOSTAL NEURALGIA

is, as a rule, caused by neuritis, and, when not due to pressure other than congestion, will be promptly cured by the same processes described in the preceding affection.

FACIAL NEURALGIA.

So-called neuralgia of the trigeminus is a very common and often stubborn affection. The exposure to which the face is subjected, and the fact that many branches of the nerve in this region pass through bony canals, or across bony prominences, make it prone to injury. Where slight pressure, from congestion of either the neurilemma or the structures surrounding the nerve, or from small tumors or exostoses, is present pain of a more or less permanent character results. One writer says that "neuralgia of the trifacial is the most frequent form, when the disease is due to malaria." So often is the condition due to a congestive hyperæmia that the early treatment of tic douloureux by the wave current, brush discharge, or sparks, acts as a prompt cure in most cases, and these methods promise very much in cases of longer standing. When a tumor, an exostosis, or aneurism is the cause, some temporary relief may be afforded, but nothing more can be expected. So also, when due to malaria, much relief may result from treatment; but the question of first importance is the treatment of the malaria.

The diagnosis of the cause of facial neuralgia is not always easy, or the term neuralgia would not be employed so often. The prognosis must be guarded in all but the recent cases, which yield promptly in all due to local congestion not caused by abscess or bone necrosis.

Treatment.—If caused by epithelioma, great encouragement is offered by exposure to the Roentgen ray. (See chapters on Therapeutic Radiography.)

The application of the wave current to a violent case of tic douloureux was the first revelation to the writer of its remarkable anodyne effects, which are now recognized by most electro-therapeutists in this country. When employing the wave current, select an electrode which will cover the face on the affected side, requesting the patient to hold it with the ball of the thumb; pressing it firmly to the affected or painful spot, connect by a rheophore, and start the machine, employing a very short spark-gap; opening it until the pain begins to be severe. At this juncture, in acute cases, many of the motor points of the face in distribution, of the nerve, become painful. If so, the patient should press the tin firmly with the fingers to such spots. The administration should be continued for fifteen minutes, during which time the operator should gradually lengthen the spark-gap. Care should be taken that this be done in the most cautious and delicate manner, as a sudden shock will be very painful and greatly disturb any patient. By gently withdrawing the rod with a screwing movement, at the same time consulting the sensations of the patient, it may easily be accomplished without casualty.

The brush discharge will give very great satisfaction in facial neuralgia. It should be applied over a surface considerably larger than the painful area (unless the whole face is involved, when the entire surface should be treated) until a distinctly rubefacient effect is produced.

Short sparks may be found of service in some chronic cases, but as a rule avail little when the other modalities fail. Strict attention to *bridging* will insure the best results. Acute cases will often require two administrations daily during the first days of treatment.

NEURALGIAS OF THE FOOT.

Podalgia and plantar neuralgia deserve attention here, because in most cases the static modalities give prompt relief.

Podalgia, painful heel, is a condition sometimes associated with flat foot, rheumatism, gout, and neuritis, and is especially liable to occur in persons who are much on their feet. The extent of the affection will vary from a small circumscribed spot to the whole surface of the heel. A few will prove intractable, even to the electro-static treatment.

The usual means for treating painful affections have merit in most of these cases, and should be employed heroically, if the case demands it. The best results have been obtained by the writer from the application of long sparks, applied directly to the painful spot.

Plantar neuralgia is apt to occur, says Osler, after "cold-bath treatment of typhoid fever." It also occurs as neuritis or with gout or rheumatism, and is satisfactorily treated by the wave current and brush discharge. In this affection sparks are rarely necessary.

VISCERAL NEURALGIA.

Gastralgia, cardialgia, nephralgia, also neuralgia of the liver, rectum, ovary, and testicles, occur with neuropathic conditions, and are often associated with cachectic and other lowered constitutional states. All call for both constitutional and local treatment. There is probably no one agency that accomplishes more for these painful conditions than Franklinism. At the same time, far be it from us to disparage the use of other tonics or safe alteratives which, associated with proper diet and good hygiene, will hasten recovery.

The tonic effects of the wave current work wonders in these conditions and cannot be too strongly advised. It matters little where the electrode is applied to produce the energizing effects. Experience with very many cases, which uniformly improved in general health while receiving local treatment and no medication, both to the body and the extremities, has impressed the writer that with patients in whom there is a lowered condition of health, without organic disease, they are coincidently restored. On general principles, we apply the long spinal electrode for tonic effects, but we are induced to believe that when prolonged administrations, aggregating from twenty minutes to half an hour, of a current measured by at least a four-inch spark-gap, have been given, it will not also be necessary to make these applications for the effects to be sought for improving nutritional conditions. Therefore, when called upon to treat these neuralgias, apply an electrode having a surface area of sixteen to twenty square inches directly over the painful surface, and continue the administration for at least twenty minutes, and the local and constitutional treatment will both have been accomplished. Daily administrations should be given for at least two weeks, and continued later every second day until health is restored.

GASTRALGIA

is promptly cut short during the attack in most instances, and when the treatments are continued for a sufficient period, generally cease to recur altogether unless persisting cause be present.

CARDIALGIA,

induced by a fatigued, poorly nourished, or overworked heart, is greatly relieved by the local administration, and often cured by a restoration to the normal conditions of health.

For angina pectoris we believe no treatment promises so much,—if atheroma of the coronary artery is not in an advanced condition,—because it lowers arterial tension, promotes the elimination of mineral salts, and preserves a constitutional equilibrium. In the treatment of false angina, occurring in neurasthenic and hysterical individuals, it is successful, as it is also in removing the associated affections.

In treating these conditions, apply an electrode about four inches square over the præcordial region, and treat the primary affection according to indications.

For relief of neuralgia of the liver or kidneys, apply the electrode and continue the administration for at least twenty minutes.

OVARIAN NEURALGIA

in most women requires tonic treatment, as well as relief of local pelvic congestion so often associated with the condition to which, when present, the pain is secondary. Apply the wave current over the painful spot, employing a large electrode when weather conditions are favorable to the use of a long spark-gap; continue for fifteen or twenty minutes. Another method often successful is to employ a large vaginal electrode connected to the machine, and the abdominal electrode over the ovary connected to the small Leyden jar, as shown in Fig. 14, Chapter VI.

The brush discharge, applied over a considerable area until a rubefacient effect is produced, will give marked relief, and, when applied daily over the lower abdominal region, will have a pronounced effect in lessening or removing pelvic congestion.

NEURALGIA OF THE RECTUM

should be treated by placing a large special electrode in the rectum and employing the wave current. If the case is not due to structural changes or foreign bodies, the result will be satisfactory.

NEURALGIA OF THE TESTICLE

is best treated by application of the brush discharge for from fifteen to twenty minutes. Few painful or congested conditions of the testicle will not yield to this modality. Great care should be taken that during the administrations accidental sparks do not pass to the testicle or the penis. (See Administration of Brush Discharge.) Sparks are not harmful, but so painful that a timid patient might not return.

MIGRAINE

is a superficial or deep-seated pain, usually confined to the temporal or orbital region of one side of the head, and in most cases associated with nausea. Heredity, neuropathic and adynamic conditions predispose to the attacks; and, in proportion as such influences can be checked, allayed, or normal conditions restored, can these sufferers be relieved. As in all nervous diseases of hereditary origin, those cases in particular are most intractable, and must be taken carefully in hand from the first appearance in childhood. The *indications* must be directed (1) to improving the general nutrition; (2) to lessening the nervous irritability by restoring, or establishing, a proper stability of the nervous system; (3) to correcting or removing exciting causes as far as possible which induce attacks; and, (4) to relieving the attacks when they do occur.

The first two and last of the indications are perhaps better met by static electricity than any other plan of treatment, while the third will call for attention to various physical derangements—as eye strain, nasal affections, uterine disorders, gastro-intestinal derangements, and overwork or worry.

What has been already said of the nutritional effects of Franklinism applies here, as in all other conditions. That which induces general functional activity restores an equilibrium, and takes the strain from the overworked parts and sets the sluggish organs to their task, unless a physical disability (as an organic lesion) is present, and thereby does much to lessen nervous irritability. High potential electricity, however, does more than this to an overstrained and irritated nervous system. It quiets, soothes, and rests exhausted nerves; producing a sense of well-being, repose, and refreshing sleep.

The *prognosis* will vary with many conditions.

When *treating* for this affection, no specified time that it will take to effect the desired result can be promised. It will always depend upon the peculiarities and progress of the individual case. It will take months, and, in neuropathic individuals, a longer time, and in a few it may be necessary to keep up treatment indefinitely to maintain an improved status that has been established; and in still other rare cases, especially with otherwise healthy individuals, the treatment will neither influence the frequency nor the severity of the attacks.

The *treatment* during the intervals between the attacks should consist of administrations daily, or upon alternate days, of the wave current for from twenty minutes to one-half hour at each time. Apply an electrode, having a surface area of from sixteen to twenty-four inches, to any portion of the trunk of the body where there may be indications for local treatment, over the upper or lower abdominal or lumbar region; or a long spinal electrode over the vertebral column. Adapt the spark-gap to the physical conditions of the patient. During an attack observe the same rule of applying the electrode, and at the same time place the point of the stand electrode over the patient's head, at a distance at which it will not interrupt the spark-gap. In some patients the breeze, thus applied to the head, seems to aggravate the pain; with such, the point placed in front of the knees, at the same distance as before, will, as a rule, have the desired effect. The polarity affects patients differently. We, generally, employ the positive insulation, varying it to the idiosyncrasy of the patient. The noise of the discharging spark-gap will aggravate some of these patients, when the balls must be widely separated. The brush discharge, applied to the aching head, will afford great relief in very many cases, while to a few it will prove an aggravation.

If care is taken to discover the idiosyncrasies of patients and regulation of dosage, few indeed will not be relieved.

HEADACHE.

The same general principles apply to the treatment of other headaches as to migraine; bearing in mind first to remove the cause, when possible.

CORRESPONDENCE.

To the Editor:

While treating Mrs. S. for neurasthenia, the following remarkable phenomenon was observed. To begin with, my static machine is a Van Houten and Ten Broeck, 12-plate, 32-inch, Morton Wimshurst Holtz Influence Machine, and is always kept in perfect condition, and generates a powerful current. My patient was insulated positively, and at the time was seated crosswise of the table, with both electric and gas lights shining on her chest, while I stood in the shadow and in the rear of her, throwing upon the spine a powerful spray. The electrode which I used was a short one, seven inches in length, made to fit on to my Ball point, held in place by a milled screw; the last two inches of the electrode consist of a cable of fine copper wire inclosed in a brass case. The electrode throws a fine soft spray. The first thing that attracted my attention was the eyelets in her corset; then I began to manipulate the electrode up and down the spine and over the entire back, and to my utter astonishment I developed the entire vertebral column, ribs, scapulæ, and clavicle. This feature of the bones of the thorax was as vivid as any I have ever seen through a fluoroscope.

I have never read of a similar phenomenon among the cases cited in either electrical journals or electro-therapeutics, therefore I mention this to ascertain if others have had like experiences.

H. S. Boardman, M. D.

* * *

To the Editor:

I notice in the Journal of Electro-Therapeutics of June, 1901, an article by G. Adolphus Phillips, M. D., entitled "Static Machines."

The doctor here describes a method of restoring static machines incapacitated by the humidity of the surrounding atmosphere. The process mentioned is that of condensing the atmosphere within the case by a compound of ice and salt, which cools and drys the atmosphere within the same and enables the machine to generate at all times of the year. This is a valuable feature in the management of static instruments, and upon which I hold United States Letters Patent, No. 589,742, dated September 7, 1897.

In justice to your subscribers and myself (also a subscriber) give the information, to spare anyone the trouble and annoyance sometimes brought about by the use of patented articles by the uninformed. Though it appears simple, yet the first practical test was made here on a machine in my office.

Yours truly,

C. H. Myers, M. D.

South Bend, Ind.

BOOK REVIEWS.

INDUCTION COILS: How to Make, Use, and Repair Them. Including Ruhmkorff, Tesla, and Medical Coils, Roentgen Radiography, Wireless Telegraphy, and Practical Information on Primary and Secondary Battery. By H. S. Norrie (Norman H. Schneider). Second Edition, Revised and Much Enlarged. New York: Spon & Chamberlain, 12 Cortlandt St.

The best review that can be given of this book is to say that the above subjects have been treated in a very masterly and practical manner. The book deals with large coils which are used principally for X-ray work, and not with the smaller Ruhmkorff coils used in medicine. It is illustrated, and many of the illustrations are described in detail. It is practically a work on the physics, or, rather, the electro-physics of X-ray work, and, as such, it cannot well be surpassed.

It is a work which everyone using the coil for the X-ray should be in possession of.

A SYSTEM OF PHYSIOLOGIC THERAPEUTICS. A Practical Exposition of the Methods, other than Drug-giving, Useful in the Treatment of the Sick. Edited by Solomon Solis Cohen, A. M., M. D., Professor of Medicine and Therapeutics in the Philadelphia Polyclinic; Lecturer on Clinical Medicine at Jefferson Medical College; Physician to the Philadelphia and Rush Hospitals, etc. Volume II., " Electrotherapy." By George W. Jacoby, M. D., Consulting Neurologist to the German Hospital, New York City; to the Infirmary for Women and Children; and to the Craig Colony for Epileptics, etc. In Two Books.

As is explained in the title-page of this work, the two volumes of Dr. Jacoby on Electrotherapy are part of a system of physiological therapeutics which are to be completed in eleven volumes.

Of the two volumes which constitute the department of Electrotherapy and which are the first to be issued, the first one is taken up entirely with the physics of electricity, the apparatus necessary to the proper administration of electricity as a medicinal agent, and the X-ray. This volume is most complete, giving in detail all that is necessary in Electrotherapy, and even more, and given with a fullness of description which few works of this kind have equaled.

Of the second volume, which deals with Electrotherapy and Diagnosis, it is not as complete or full in detail as is the first volume, yet there is a large amount of information contained in it, and information of the kind that can be wholly relied upon, and it may also be said is well up to date.

The two volumes certainly present in workmanship, in paper, in binding and detail, a very fine specimen of bookmaking, and do credit to these well-known publishers. The set of eleven volumes, so nicely gotten up, cannot fail to attract attention.

The other volumes to be contained in this system are " Climatology and Health Resorts, including Mineral Springs," two volumes; " Prophylaxis, Personal Hygiene, Nursing and Care of the Sick "; " Dietotherapy, Food in Health and Disease "; " Mechanotherapy, Physical Exercise "; " Rest, Mental Therapeutics, Suggestion "; " Hydrotherapy, Thermotherapy, Phototherapy, Balneology "; " Pneumatotherapy and Inhalation Methods "; " Serotherapy, Organotherapy, Blood Letting," etc.

EPITOMES.

SOME GENERAL REMARKS ON ELECTRICITY IN GYNECOLOGY.

BY G. BETTON MASSEY, M. D., PHILADELPHIA.

No one who is familiar with the general practice of electrotherapeutics, on the one hand, and with the special uses of electricity in gynecology on the other, can resist the conclusion that the electric treatment of the diseases of women yields the most brilliant results to be found in the whole field of electrotherapeutic practice. The reason for the predominant value of this agent in gynecology is most clearly comprehended by the physician who has previously been familiar with electroneurology, in which he has learned its limitations in the large class of nervous diseases where it is impossible to bring the seat of the disease under the direct influence of adequate current.

The morbid processes, whether post-infective, trophic, or circulatory, can be directly reached by effective currents in gynecology, with results that produce immediate, progressive, and lasting improvement in the well-being of the patient; leading finally to a cure in most cases.

Before entering more fully into the methods by which these results may be attained with reasonable certainty, I propose to make a few remarks on the general purpose of gynecologic practice. A reader of the average text-book on the subject cannot be otherwise than impressed with the view that the physician's work in this department consists mainly in the correction of mechanical faults in the pelvic organs. Calm reflection will show that the proper objective point should be the relief of suffering and the restoration of function; and, while the correction of mechanical faults is often essential to these ends, it is clear that a set of organs of such highly specialized nervous and vascular functions are most often at fault through derangements of innervation and blood supply. If to these we add the sequences of infective processes, we have marshaled the pathologic conditions of probably more than nine out of ten gynecologic cases that apply to the physician for aid.

Faults of innervation and blood supply, whether due to lack of development or bad sexual hygiene, are equally amenable to properly applied currents, plus hygienic regulations; and when it is also understood that the best treatment of the great majority of post-inflammatory and post-infective conditions is electricity, with the single exception of purulent collections or cysts, the ease with which the skilled electro-gynecologist may cure most of his cases is evident.

Neuro-vascular Disturbances.—Many ovaries, and even uteri, have been sacrificed by removal when the only fault was either a developmental irregularity of the vascular supply, or a neuro-vascular ovarian disturbance secondary to a catarrhal uterus.

Chief among primary developmental faults are those cases of young women subject to menorrhspasms. If the resulting menorrhalgia (dysmenorrhea) is not extreme, many of these patients can be relieved by mere external applications of the galvanic current. Should this not suffice, a certain cure can be obtained by skillful intrauterine applications of an aseptic electrode with twenty to thirty milliamperes, negative, once a week through three intermenstrual periods. The negative pole is employed to favor a fuller flow, not for dilatation, which is totally unnecessary. Should there be any endometric catarrh, the positive pole should be employed instead; the indifferent pole in each case being on the abdomen. Concurrent fine-wire faradic applications are a help. These procedures are advised instead of dilatation and curetting, which are rightly termed " dangerous operations " by John B. Deaver in a recent paper read lately before the College of Physicians of Philadelphia.

When there is ovarian tenderness or intermenstrual pain in the pelvic organs, which may be said to be a form of secondary developmental fault, the proper form of electric treatment is strictly vagino-abdominal and not intrauterine. Forty or fifty milliamperes should be used if post-inflammatory conditions are suspected, and the fine-wire faradic current in combination (following the galvanic in the same sitting) or alone, in any case. The treatment may take time and patience, but it will save ovaries and restore patients to normal health.

Post-infective Disorders.—An obstinate endometritis or metritis is sure to yield to mercuric cataphoresis, if mere positive applications with the galvanic current fail to promptly cure. The mercuric method is easily applied by amalgamating a copper intrauterine sound with mercury and employing it, with shank properly insulated, as the positive intrauterine pole, with twenty-five to forty milliamperes.

The sequels of a chronic pelvic inflammation are best treated by a prolonged course of vagino-abdominal applications, many of these cases finally attaining comfort and comparative restoration of organic mobility after all the parts have been matted together by a pelvic peritonitis. The presence of an abscess or of encysted pus contraindicates electricity.

Neoplasms.—Concerning fibroids, it may be affirmed that all hemorrhagic cases are symptomatically curable, particularly if the Apostoli treatment is modified by the employment of zinc-mercury or copper-mercury anodes, which permit of more vigorous and frequent treatment, being essentially antiseptic. These fibroids, and many other interstitial fibroids of non- hemorrhagic character, can be greatly reduced, and, in exceptional cases, caused to disappar by absorption. Subperitoneal and degenerated fibroids should be referred to the abdominal surgeon.

Of cancer of the cervix, it may be said that the writer's method of massive cataphoresis of mercury from a gold anode affords a strong possibility of a cure in the early stages, and will control hemorrhage and pain in those that are inoperable.—Int. Med. Mag.

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ACTION OF RADIUM RAYS.

H. Becquerel has confirmed, by an unpleasant experience, the fact first noted by Walkoff and Giesel, that the rays of radium have an energetic and peculiar action on the skin. Having carried in his waistcoat pocket for several periods, equal in all to about six hours, a cardboard box enclosing a small sealed tube containing a few decigrams of intensely active radiferous barium chloride, in ten days' time a red mark corresponding to this tube was apparent on the skin; inflammation followed, the skin peeled off and left a suppurating sore, which did not heal for a month. A second burn subsequently appeared, in a place corresponding to the opposite corner of the pocket where the tube had been carried on another occasion. P. Curie has had the same experience, after exposing his arm for a longer period to a less active specimen. The reddening of the skin at first apparent gradually assumed the character of a burn; after desquamation a persistent suppurating sore was left, which was not healed fifty-six days after the exposure. In addition to these severe "burns" the experimenters find that their hands, exposed to the rays in the course of their investigations, have a tendency to desquamate, the tips of the fingers which have held tubes or capsules containing very active radiferous material often become hard and painful. In one case the inflammation lasted for fifteen days and ended by the loss of the skin; and the painful sensation has not yet disappeared, after the lapse of two months.—Comptes Rendus.

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SKIAGRAPHY AND FRACTURES: ESPECIALLY IN THEIR MEDICO-LEGAL RELATION.

C. H. Golding-Bird (British Medical Journal, June 8): After first mentioning the dangers of the popular misuse of the X-ray, Golding-Bird discusses the subject from the surgeon's point of view. While no one will question the value of the method in the diagnosis, its use is unnecessary in the larger proportion of cases one is called upon to treat; yet there is a certain class of doubtful cases where it is most desirable. These are of two kinds: one in which, though certain of fracture, there is a doubt as to the exact locality, its direction, or perhaps its involvement of a joint; the other, where the existence of fracture is doubtful; and while this doubt may not necessarily modify the line of treatment, yet should the patient get skiagraphed on his own account, and be able to demonstrate a fracture, a suit for malpractice might arise, or other embarrassment to the surgeon. Of this second class, fractures of the fibula and vertical or transverse fractures anywhere, and certain forms of fractures around the hip, are examples. Thus, he mentions Pott's fracture, which may occur without characteristic deformity and be diagnosed as severe sprain.

A vertical fracture involving the knee-joint, a purely transverse fracture without displacement, notably in the lower end of the tibia (in which the patient is still able to stand), and impacted fractures of the hip are hard to be certain of. Patients, moreover,—especially private ones,—insist on positive knowledge of the state of their bones after injury. People have a morbid dread of bone injuries, and great comfort may be given by the mere assurance that the bone is not injured. Therefore, the skiagraph may be very useful, as a diagnostic evidence to the surgeon to satisfy his patient. It would be a bad thing if the diagnosis were relegated entirely to this method, and overreliance upon it is also to be deprecated.

It is only as a subsidiary generally that the skiagraph should be employed, and even then its evidence should be received with caution, and only after due interpretation by someone whose experience warrants his speaking with authority.

Another use of the X-ray is to judge the results of one's handiwork, and Golding-Bird thinks this is rather unreliable. The laity, and often some physicians, have a very poor idea of the actual conditions even of successful cases of simple fracture. Functional performance may be perfect and yet the X-ray show a decided deformity. The skiagraphs show that, in order to satisfy æsthetic requirements, almost every case should be operated upon and the bones adapted by screws, wires, or by some other means. If the final appeal is not to utility, but to the beauty of the bone scar, then every case must be thus treated.

Before deciding upon the value of the skiagraph, we must inquire whether it really represents things as they really are, and this is a further argument against employing it as a critic of a surgeon's work. He asks, can skiagraphs show fracture where none exists, and answers that it can. Epiphyseal lines on the long bones—the end of the ulna, for example—have been mistaken for fractures. Impacted fracture of the neck of the thigh can be imitated by taking a foreshortened view. Fracture through the base of the olecranon is simulated always where the light is directly over the bend of the elbow, the plate being posterior. The band of light is due to the rays penetrating the joint; a lateral skiagraph destroys the illusion. The acromio-clavicular joint resembles a fracture and has been mistaken for such. The appearance of gradual thickening of the bone can be produced at will. He is indebted for these and other references to the report of the American Surgical Association on the medico-legal relations of the X-ray, in the American Journal of Medical Sciences, for July, 1900.

The second question: Is it possible to miss seeing a fracture? Yes; though rarely. Usually it is recognized by irregularity of the bone outline, but, where this is not easily seen, attention to the outline of the medullary cavity generally shows it. In the ribs, especially the lower ones, because of the shadow of viscera, in the spine between the fourth and twelfth vertebræ, because of mediastinal structures, fractures may be overlooked. In the ends of very young bones centers of ossification may be mistaken for detached bone, or vice versa. Anatomical depth, as in the hip, has caused trouble in recognizing fractures. The base of the skull is hardly likely to receive aid from the skiagraph. Is it possible to show fracture as still existing, though long united? He states that it is. Early callus will not show, and for the first three months the unpracticed observer might not see it distinctly. Similarly, the line of union will seem to be one of separation. Can distortion be produced? Yes; by foreshortening. The appearance of gradual expansion of the bone can easily be produced by want of parallelism between the plate and limb and may be read as indicating injury.

Looking at the subject from the patient's point of view, the question of X-ray and fracture becomes a very serious one. It is not possible to prevent the use of the X-ray by a patient; therefore, instead of awaiting the attack, the surgeon should disarm suspicion first. He should be told, moreover, that the new photography is no measure of the cure, that the setting of fractures is not a piece of accurate cabinet-work; the people should be instructed in the uncertain indications that skiagraphy gives. The lawyer should learn that it is not a reliable witness. It cannot stand alone, even for everyday practice or diagnosis; still less can its testimony be invoked for the defense or attack in a court of law.

ELECTROLETS.

—Drs. Clifford Beale and Hugh Walsham contribute to Treatment an interesting article on "The Diagnosis of Tubercular Disease of the Lungs by means of the Röntgen Rays." They assert that it is possible sometimes to detect disease at an earlier stage, and estimate the extent of previously existing disease with greater accuracy, than by any other methods as yet employed. They add that the appearance of tubercular shadows, however, is indicative of disease which has already gone beyond the initial stage.

—A new electric lamp has been devised by Dr. Sophus Bang, the manager of the laboratory of Professor Finsen, the inventor of the lupus light cure, specially adapted for utilization in connection with the cure. In this lamp the inventor has substituted metal in lieu of the carbon poles, and although a very feeble light is emitted, it is stated to be exceptionally rich in the chemical rays. By this means the therapeutic properties of the light are increased tenfold. Consequently, a patient who at present has to submit to an operation lasting one hour and a quarter will only require, approximately, ten minutes' treatment at a time. The cost of the lamp also is so low that it would be possible for every doctor to possess one, since it can be fitted to an ordinary electric-light installation.

—In the British Medical Journal of June 8, 1901, Andrew Clark cites a case of carcinoma of the breast in a woman sixty years of age; showing marked improvement since being treated with the X-ray. The treatment consists of exposure of the parts affected, five times a week, for fifteen minutes at a time. The induration has diminished progressively, and pain has almost subsided. The axillary glands have also become smaller, and the general health of the patient has materially improved. This is in corroboration of many other similar cases reported recently, and evidently tends to confirm the statement that the X-ray is a germicide and parasiticide of the first order, the scope of which is still but little understood.

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ABUSE OF ELECTRO-CAUTERY IN NOSE AND THROAT SURGERY.

BY IRVING TOWNSEND, M. D., NEW YORK CITY.

The title of my paper will not particularly commend it to the members of this Society, but I think most of you will agree that negative evidence is often of value, and that it is as essential to know the things we should not do as those we should do.

The discovery of the local anæsthetic effects of cocaine was soon followed by a general use of the electro-cautery, to reduce hypertrophies of tonsils and turbinates and other conditions of the nose and throat to which it seemed applicable. Local anæsthesia gave a great impetus to this branch of surgery and, combined with the use of the galvano-cautery, removed two great obstacles, viz., pain and the fear of hemorrhage.

The simple technique of this method commended it to physicians as well as patients, and the relief it afforded in many cases served to make it very popular.

Ten years ago it was the fashionable thing to have your "nose burned out," and unless your physician had a cautery battery he was not considered up to date.

This general belief naturally led to the indiscriminate use of the electro-cautery, and the disastrous consequences of such practice were not recognized for several years; and even at the present time many of us continue its use where more effective means might be employed.

I think most specialists will agree with the statement that cauterization has a very limited field, in comparison with the other methods of operating in the nose and throat.

In the removal of hypertrophied tonsils or turbinates, as well as other growths in this region, a cutting instrument is the proper thing, as a sharp knife, scissors, or forceps will remove the excess of tissue and leave a wound that heals promptly, without unnecessary inflammation or sloughing.

If the patient refuses to have a cutting operation, or is a "bleeder," or the tumor be soft or very vascular, the cautery may be used with advantage.

The process of repair in cartilage is by a proliferation of preexisting cells, and not by exudation; hence it is retarded by the inflammatory effects of the cautery, whether located in the nose or larynx.

While the electro-cautery has a limited field of usefulness in the nose and throat, in certain cases it is a valuable addition to our armamentarium; but I am confident that electricity will be more useful in this specialty, as we learn to apply the galvanic current systematically for certain definite effects.

I use electricity considerably in nose and throat work, and with much satisfaction, but constantly feel the need of a further knowledge of the means for applying it scientifically, and with greater accuracy than heretofore.

As the cautery plays a diminishing role in the practice of general surgery, it must eventually be relegated to a similar place in nose and throat work.

Whatever may be accomplished by electricity in our special branch, it is safe to predict will result from more intelligent methods of application than the practice of reducing hypertrophied tissue by causing a large slough, which may leave healthy granulations beneath, or an inflamed wound which is slow to heal. I do not wish to be understood as condemning the use of the cautery altogether, but as asserting my belief that it has been and still is used without justification; and when better and more effective means are at hand.

DISCUSSION.

Dr. Wm. R. King: I would say a few words upon this point. I agree with Dr. Townsend in the main in regard to his opinion that much cautery work is done where it would be better if left undone; that much area is exposed to the cauterant that is entirely healthy, and that would perhaps be left alone if the cutting instrument were the instrument proceeded with. However, I do get some excellent results in both these classes of diseases—hypertrophied tonsils and turbinates. I have had very little experience with the galvanic current in reducing these diseased parts, and it is a subject which I have not yet paid sufficient attention to, to go into it with intelligence. But particularly in cases of hypertrophied tonsils, where the tonsil is not degenerated—I mean by that materially altered in consistency, and not one of the degenerations which are caused by long-standing disease—but where it is simply an hypertrophy, and the tonsil is soft and big, and yields when pressed upon, and perhaps both tonsils have met in the middle of the throat, I almost invariably advise the use of the cautery for reducing them, and for two reasons. I am one who has seen one almost fatal hemorrhage by ablation of a tonsil, such a one as I think it is not necessary to ablate. This class of tonsil, hypertrophied tonsil, can be made normal in size, and to a great extent its function retained, I am sure, when reduced by means of the galvano-cautery. If we remove nearly the entire tonsil by ablation, we have lost this gland, which was put there for a purpose, undoubtedly; but if the gland is diseased and is simply a foreign mass there, and of no use, I do not hesitate at all to advise its removal by the knife, unless some contraindicating condition be present.

In the nose the results of the cautery have been good, and particularly in some cases of persistent hay fever. There is unquestionably a class of hay-fever sufferers in which the nose is not at fault, except secondarily. I believe we know that the cause rests more deeply, but there is unquestionably a class where there are areas of local hyperæsthesia. I have administered this treatment in those cases, and I have relieved one case of eighteen years' standing, without a year free from hay fever in that time, after about—I have forgotten how many sittings. But notwithstanding the long continuance of the disease, which came on each August and lasted a month or six weeks, after three years of treatment in this way, in the early spring the hay fever disappeared and remained absolutely absent during three years; the first year greatly subsiding, the second year there being very little, and the third year none at all. This is only one case; there are numerous other cases that could be reported.

Dr. Townsend makes in his paper a very proper plea as to the improper or too free use of the galvanic cautery in this line of surgery; and undoubtedly the too free burning out of the nose is very objectionable.

Dr. Wm. H. King: Do you remove the tonsil by puncture or the snare?

Dr. Wm. R. King: Neither; usually by a system of drilling and puncture. A number of sittings are necessary, depending on the size of the tonsil; but I principally drill the tonsil, and then puncture into the gland and into the stroma of the tonsil. There is no pain at all, and even children submit to it without a particle of difficulty, in most instances.

Dr. Wm. H. King: In some of these cases treatment will reduce the tonsil so promptly that it almost surprises you. In fact, a single treatment will take it away before you know it. In others you have to treat it a great many times before you get any result. Now, is not this due to the condition or the pathology of the enlarged tonsil? I would like to ask the throat men present what that condition is.

Dr. Wm. R. King: I do not know personally that I have given that matter a great deal of thought. That is going into the primary pathology of the matter. I find as a rule that the softer and more yielding a tonsil is,—where it is practically almost a puffed tonsil, where you touch it with a probe and it yields readily, yet it is not cystic, there are no fluid contents, it is simply a soft mass,—that growth usually yields most promptly. The hypertrophied tonsil that is firm when pressed upon with the probe, I think is inclined to be fibrous and incapable of solution and absorption.

I have only recently completed the removal or reduction of the tonsils in the case of a young professional singer, a prima donna of one of our opera companies, who had been singing through these enlarged tonsils. She had an excellent voice, and one that had received excellent training, and which had obtained for her suddenly the position of prima donna in one of these companies, to fill a vacancy; but so satisfactorily did she fill the place that she has been continued in this position through the past season. Lately, however, a decided tremolo had appeared in her voice, which her teacher could not account for. I diagnosed her case as being one in which by her great power and strength she had been enabled to sing through those tonsils, but at the expense of the muscular power to make those tones. I could find nothing wrong—the larynx was apparently perfectly normal, but I thought the adductor muscles had been overworked—but that is a theory entirely. The removal, or the absorption and the removal, of the hypertrophied tonsils and of some little hypertrophied turbinates, not very marked, however, put her in a position to fulfill the duties of this position again through all the past winter, to the satisfaction of all concerned. And there was nothing else done—that is, with the exception of some general treatment she had from her family physician for general conditions, which did not seem to have any connection with this, so far as I know.

Dr. Townsend: In reference to Dr. King's question, I do not know that I am capable of answering as to the difference of hypertrophy in the different conditions he mentions. I think there is every gradation between the simple swelling, which no doubt is taken down readily by the cautery, and the dense hypertrophy which is the result of strong sub-acute chronic inflammation, in which case whatever function—useful function—the organ ever did perform, has been lost. The hypertrophied tonsil, as a general rule, I believe to be a diseased tonsil; and from that view of the pathology, it would seem to be the proper thing to remove that diseased tissue.

I was very much interested in hearing Dr. King mention the case of the singer, and I think those cases are similar to, perhaps are merely an aggravated form of, a type of case we see quite frequently where we have obstructions in the pharynx or the fauces or the naso-pharynx, and the muscular power of the larynx being sufficient to overcome the resistance to the current of air.

* * *

IRRITABLE CERVIX AND DYSMENORRHEA.

BY H. P. COLE, M. D., HARTFORD, CONN.

In order to properly comprehend and treat dysmenorrhea we must consider that the menstrual period extends from puberty to the climacteric; for though the external evidences of menstruation occur only once in three or four weeks, very many women are never entirely free from the influences or disturbances of that condition, which begin at from ten to fourteen years of age and will end at from thirty to fifty-five, if death or the modern surgeon does not interfere. We must, therefore, therapeutically consider that it is one continuous proceeding; for as soon as one flow ceases the uterus begins to get ready for the next, or for another event liable to every married woman—the retention and development of the impregnated ovum and the growth of the resulting fetus. This proceeding utilizes the surplus blood until the fetus is cast off, when the ordinary programme is continued. The tide never ceases; we call it high tide when the sea reaches its highest level and low tide when it reaches its lowest level; but, though these two points are attained only twice in twenty-four hours, there is no time between the beginning and end of the world when the forces that produce this phenomenon are not in operation. As in life we conquer one difficulty only to be met by another, so the menstrual life of woman suffers many repeated and recurrent disturbances, which gradually lead up to a general and local hyperæsthesia which will not tolerate what would otherwise pass unnoticed. The uterus is so situated and constructed that it is the victim of many possibilities. It is suspended loosely in space, so that it can be easily pushed about by anything that encroaches upon its territory and its surrounding circulation be interfered with. Its walls are thick, and, like the liver, its blood vessels are sinuses more than independent structures; thus admitting of passive congestion, which increases its weight and causes pressure upon the nerves supplying it; and it is lined with a mucous membrane that is continuous with that of the vagina and that of the fallopian tubes.

Our patient, then, is liable to malposition from the encroachment of some surrounding condition—prolapse from overweight of the uterus, and pain and exhaustion from continued pressure upon the sensitive nerve fibers of the uterus, through distention and congestion of its walls. As the two portions of the uterus—the cervix and body—are quite different in their size, structure, and office, and as the point of junction is smaller than any other and the canal at this point is more contracted, it is not unreasonable that this is liable to be the key to the situation. It is here that flexions occur, and, being the narrowest point, the pressure of the menstrual flow is greatest here. It is situated between two fires, as it were, for its condition is affected by all diseases of the vagina and os on one side, and those of the body and fallopian tubes on the other. We can readily see, then, that the condition, to which we could give the name "irritable cervix," is not an independent one, for with it may be associated many departures from the normal; nor can it be called a primary condition, for it is usually the result of many pre-existing diseases, that have so disarranged the normal tissues that this is possible.

On account of the fact that the ordinary nerves of sensation are not as numerous as those from the sympathetic system, and that the spinal nerves are somewhat benumbed by the pressure of the distended tissues upon them, the symptoms of irritable cervix are usually more reflex or distant than local; therefore headache, delirium, backache, cough, or dyspepsia will as often call our attention to the uterus as will local pain, especially if they are intermittent, or if, though more or less permanent, they are increased at the menstrual time. Having thus gone over the causes of irritable cervix, what indications do we get for its treatment? They are, first, the removal of all contributing causes—that is, all encroachments on uterine territory, all interferences with circulation, and any external influence that would cause malposition; second, stimulate contraction of the muscle fibers of the uterus, thus reducing its bulk and establishing a better circulation that will reabsorb the effusion and reduce the caliber of the blood vessels; and, lastly, to soothe the inflamed and injured nerve fibers so they will become more tolerant of that ordinary pressure which in health they did not notice.

We will often find that a retro- or ante-verted uterus cannot be made to assume its normal position, even with the patient in the Sims' or knee-chest position.

By passing the finger between the uterus and the organ toward which it leans, we shall usually find some bands of adhesion thrown out between the peritonial coverings of the too contiguous organs, holding them firmly together. These adhesions will have to be broken up before we can accomplish much, for menstrual pain is as often due to the tugging of an overweighted uterus against them as to pressure upon a contracted cervix; for they hold the uterus in an abnormal position, causing flexure at the cervix, which of itself will lead to inflammation.

Dysmenorrhea is not always caused by an organic contraction or stricture of the cervix, though it is the most sensitive point in the whole organ; but it is the sphincter of the uterus, and through its circular muscle has much control over the blood supply, and over the ability of the uterus to empty itself, even though it will admit a fair-sized sound. It is not, then, always the size, but the condition, of the cervix that causes pain or reflex disturbance. Looking at the matter in this light, we can see how electricity will be of much service to us, and I very seldom get through a case without its aid at some stage of the treatment. There are two conditions in which it is of special service: one is the sensitive, irritable condition due to congestion only; and the other is a thickened, indurated condition, the result of the exudation of plastic lymph into the walls and mucous membrane of the cervix. The first will call for the use of the positive fine-wire faradic current. In these cases, when a sound touches the cervix it will immediately contract and might absolutely forbid the admission of the instrument; but under the soothing current and careful, slight pressure of the sound the muscle will relax, and, without much pain, quite a large instrument can be passed and the sphincter actually dilated. But this must be carefully watched at first, for there is a point at which toleration ceases, and the quicker this is recognized, the less harm will be done. The dilatation of the sphincter produces better circulation throughout the organ, and we can often see the color of the cervix change from dark to light during the treatment. This change in the color is not due to the electricity alone, for I have often accomplished it with the use of the sound by itself; but the current aids us materially in the use of the sound, often making its use possible, and adds decidedly to the amount of the benefit. The current should be mild, and should be continued until the sound passes, or from five to ten minutes, when we can tell whether the sound will pass, or not, to advantage at that sitting.

In the case of the plastic exudation the galvanic current must be used, with the negative pole at the uterus. The amount of current should be regulated by the amount, density, and apparent age of the exudate, and should range from five to twenty milliamperes.

This work must be carefully watched, as it is very liable to irritate, if carried too far, and I have been in the habit of changing to the positive faradic without removing my sound, after using the negative galvanic for a time; thus relieving the irritation of the galvanic treatment, for these cases are often very sensitive. I have never known any appreciable disturbance from the use of the faradic, and I am liable to use it on every sensitive case that comes to me for treatment, whenever they begin to complain of the pressure of the sound. By holding the sound perfectly still for a minute or two, the face begins to straighten out, and the whole body to relax, when, by gentle pressure, if the sound is properly directed, it will advance gradually, for the cervix has also relaxed, though not completely, for we can feel it grasp the sound as it passes through, step by step, as it were. These cases sometimes, without the aid of electricity, will give way by carefully holding the sound against this spasmodically contracted muscle; but in many cases we shall not succeed, for the pressure of the sound will increase the sensitiveness, and by the aid of the electric current, and waiting until the relaxation occurs, the sound will often pass through easily. These cases if very gently handled, will gradually give way and the patient will be relieved of many distressing symptoms, reflex and local.

I do not consider any case properly treated where the sound is not passed; for a sensitive and contracted cervix will cause more headache, backache, irritation of bladder and stomach than any other condition except irritable rectum. It will materially interfere with the circulation in the whole organ, and will retain behind it all the menstrual blood that is not crowded through this contraction by the pressure of more behind it. In these sensitive cases I almost invariably find, if the treatment is adopted immediately after the menstrual period, that there will be menstrual blood enough retained there to create a good deal of disturbance. That is, when the production of the menstrual flow ceases, all that then is contained in the uterus, especially if it is retroverted, remains there, producing endometritis, which will by contiguity extend out the fallopian tubes, and create a discharge that will pass down into the vagina; causing vaginitis, leucorrhœa, etc. etc. The cervix is, then, the key to the whole situation. In cases where the body of the uterus is much relaxed and top-heavy, making it liable to retroversion, the coarser-wire faradic or the positive galvanic current may be carefully used a few times at long intervals. With this galvanic current we must employ a carbon or an aluminum electrode or contact point, as others will corrode.

I think the cervix may be called more aptly the key to the situation than almost any other point. The application made to the cervix through the vagina with tampons, or anything of that description, we shall find will fall far short of remedying the condition. The cervix is the contracted point. It is the sensitive point. It retains menstrual blood, and it interferes with circulation, and unless this be relaxed, and a more tonic circulation established in some way, you will not get the results that you seek.

STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

BY WILLIAM BENHAM SNOW, M. D.,

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CHAPTER XI.

GENERAL TREATMENT OF PARALYSIS.

Paralysis is "a loss or diminution of the powers of contractility in the voluntary or involuntary muscles, or of perceiving sensations."

Such a condition, occurring in a large or small portion of the body, may be induced by injury, degeneration, or pressure extended upon the corresponding centers in the brain, the spinal cord, or in the course of the nerve between the centers and its peripheral distribution. The two former are termed central, and the latter peripheral, paralysis.

The degree of recovery will depend upon (1) the promptness with which the cause, if a central lesion, is removed; (2) the maintenance of the nutrition of the parts paralyzed in the interval between the onset and the recovery, if possible, of the normal function, and (3) the employment of physical or medical measures which shall facilitate the removal of the cause or the maintenance of nutrition, or both.

The continuance of pressure upon ganglion cells, whether from a clot congestion or gumma, causes their destruction within a brief period of time. Likewise, cells cut off from nutrition by obstruction of the blood channels, by thrombosis or embolism, soon degenerate. Ganglion cells, once destroyed, are never restored, nor the function of the parts in the corresponding nerve distribution.

The *prognosis* of a given case of paralysis, then, will depend upon so many unknown conditions that, in most cases of central origin, it should be very guarded. In peripheral paralysis, however, the prognosis is generally favorable.

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Paralyses caused by brain lesions will be associated with a very small degree of atrophy, to which the cases due to lesions of the cord show a decided contrast. The marked atrophy in the latter is undoubtedly due to the involvement of the trophic centers which influence nutrition, while in the former, and in peripheral paralysis, only the atrophy of disuse will occur. Peripheral paralysis will, in most cases, be recognized by the history, peculiar features, and generally prompt recovery. In some, however, it will be difficult to locate the lesion.

The general *indications* for treatment are, (1) if possible, to remove the cause, (2) to preserve the local nutrition of the parts paralyzed, and (3) to preserve the patient's general health and nutrition.

The causes, for the purposes of consideration, we will classify as (1) obstructive, (2) traumatic, (3) congestive, and (4) specific.

The *treatment* in many instances will combine with the electrical administration, medical or surgical measures, to which it is only possible to allude in the most general way, for, while such measures are often invaluable, it would not be practicable to treat them to any extent in a work on electrotherapeutics.

The remedy for removal of obstruction or pressure due to pathological conditions (which amounts to the same thing) is one which will assist or promote reabsorption, or the establishment of the collateral circulation to supply the parts cut off. In this line very little can be accomplished—nature's provisions alone can bring about the restoration. Strychnine, to quicken the activities, and tonics and nutritious diet do much. But when possible for the patient to receive the tonic static administrations, which increase secretion, promote absorption, improve general nutrition, and relieve arterial tension, their value is certainly apparent.

Traumatic cases, when associated with depressed fragments or portions of bone, or a disarticulation or fracture of the vertebral column, first demand surgical measures. Later these cases, as well as those of concussion, in which congestion, active or passive, from the very nature of things must result, call for the same active local treatment as congestions generally, the consideration of which follows.

The *congestive* lesions of the brain or spinal cord are the most common of all causes of paralysis, being more or less a factor in all obstructive and mechanical cases, and from this fact we look for the greatest measure of success from electro-static administrations in the very earliest possible stage of the affection. When making this statement it is with a full realization that it is in direct opposition to the long-established dictum of neurologists and electrologists. In defense of this departure it can be explained that when electricity has been employed in paralysis, until possibly within the past few years, it has been either the constant or the interrupted (faradic) currents. To the former can be attributed injurious effects due to electro-chemical action, and the latter was so deficient in electromotive force that no effect whatever was made upon the inflammatory conditions within the spinal canal. Now that it can be demonstrated that either the vibratory or electrical effects of currents of great potential, or the combined effects of both, do materially and efficiently lessen deep local congestion, what contraindication can be presented against their employment in inflammatory-cord or brain affections? If a deep knee or hip-joint affection of such character can be relieved, why not a congestion within the spinal canal. Such was the writer's premise more than two years ago; and experience with an ample number of cases of his own, and by his advice in the cases of other physicians, has proved that the theory was correct. The two following cases of anterior poliomyelitis, the first of which was reported by the writer in a paper read before the Post-Graduate Clinical Society of the New York Post-Graduate Medical School, in a paper entitled "The Electro-Static Treatment of Some Forms of Paralysis." A child, thirteen months of age, after six weeks' treatment in the clinic of an able neurologist in New York, was referred to me, in the following condition: Complete paralysis of both lower limbs, except power to move the toes on one foot, and the reaction of degeneration well marked.

When the child was brought to the office on the morning after the first administration, he could move the feet at the ankle joint, and on each subsequent day there was additional power of motion, and after six treatments he could move ankle, knee, and hip joints with ease and considerable force. The case then disappeared; the mother, a Polish Jewess, thinking the child cured. The other case was referred to me by Dr. A. H. Allen of Gouveneur, N. Y.; and I herewith give the doctor's report of the case in a communication received about one year later:

"F. F., a boy aged fifteen, previously healthy, was taken in the night of March 3, 1900, with fever, vomiting, and pains in the back and legs. On trying to get up in the morning he was unable to walk. During the next forty-eight hours he became entirely paralyzed, excepting his right shoulder muscles, which did not become involved. The paralysis also extended to the right side of his face. He was completely helpless. I prescribed the usual remedies, but there was no improvement in his condition.

"A few days after this business called me to New York, and I consulted Dr. Wm. Benham Snow in regard to the case. He advised me to begin treatment at once with static electricity, and instructed me in the method of using the current for this particular case. On my return, two weeks after the boy was attacked, I found there had been no improvement. The muscles of his limbs were very flaccid, and atrophy was well marked. March 18 I had the boy well wrapped in blankets and brought to my office, and began the electrical treatment, as instructed by Dr. Snow, which consisted of the Morton wave current to his spine and frictional and indirect sparks to the whole surface of his body and extremities.

"For the wave current I employ an electrode 10 inches in length by 1 1-2 inches in width. I employed the current for twenty minutes to the upper portion of his spine, and then the same length of time to the lower portion, following this with the frictional and indirect sparks. This treatment was employed daily for two weeks, and then every second day.

"The effect of the treatment was almost magical. After the sixth treatment he was able to walk through two rooms in my offices to the operating room. He continued to improve steadily, but his left hand and arm were least responsive to the treatment, and he did not regain their entire control until some time in August. Since then I have been treating him very irregularly, as he thinks he is well.

" He was able to row a boat and play ball and football during the latter part of the summer and fall, also to hunt and fish.

" There is still some atrophy of the muscles of both hands and forearms, and a little in both legs below the knees. To see him walk one would hardly notice anything wrong with him, unless they were very observing. He does any kind of work he chooses to do, and there is no difference in the strength of the limbs on either side.

" Each treatment was of about forty-five minutes' duration; twenty minutes each to the upper and lower portions of the spine, and about five minutes to the indirect and friction sparks. With the wave current, the spark-gap was about one inch at the beginning of each treatment, but was gradually lengthened to five or six inches. (The machine was an eight-plate Holtz machine, having plates thirty inches in diameter.)

" I am fully satisfied that, had the treatment with electricity been commenced as soon as the disease showed itself, the atrophy of the muscles would have been prevented.

" This seems to me an exceptionally good result for so severe a case of anterior poliomyelitis."

This case so well illustrates both the method and results of static treatment that, with the doctor's consent, I have included the record in full.

The same results have been obtained in other cases, and without exception, when the treatment has been instituted early. After two months have elapsed, however, the prognosis is very different and the treatment less satisfactory. In other words, when the pressure of the inflammatory process, or its effects, have not been relieved for so long a period, the ganglion cells perish, and paralysis then persists. It is certainly wise, however, to pursue the treatment so long as there is any improvement, because the disability may have resulted from a temporary involvement of the trophic centers, and many ganglion cells may not have perished, but their relations to the impaired muscles have become such that the performance of their functions remains unimpaired. The results from treatment can be explained in no other way. After a year has elapsed the chances of improvement are poor indeed. Cases of anterior poliomyelitis have been chosen, to illlustrate the fact that congestive conditions can be relieved by the electro-static modalities. The other affections of a congestive or inflammatory character are to be considered in the same category, as has been shown in the preceding chapter, when considering the treatment of tabes. The management in all cord cases is practically the same as there described, and we will not repeat, except to impress the importance of administering the current with sufficient energy to reach the part affected; while, when treating very large muscular or fat individuals, it may require relatively small electrodes and a spark-gap of ten or twelve inches—there is no danger of making it too great, if it is not disagreeable to the patient. An intense penetrating effect is demanded.

When the lesion is of the brain less can be accomplished, but the wave current over the cervical region, and the brush discharge vigorously applied over the scalp, will be fairly effective.

In cases of Bell's palsy no measure is so prompt and effective, because it is, as a rule, due to a congestive lesion. The writer has not infrequently known cases, which have come under observation within the first days, to be cured within a week. The cases in which the lesion is supra-nuclear or cortical, which are relatively rare, are recognized from the fact " that the upper muscles of the face are but little affected (the orbicularis palpebrarum and frontal muscles), the muscles which go to the angle of the mouth suffering chiefly."

The peripheral cases are most commonly of neuritic origin, arising from exposure to cold, as from a draught of cold air, and are promptly relieved by administration of the wave current and brush discharge, if treated early.

The application of static electricity to the relief of congestion is to all intents and purposes the same, without regard to the location, for it is never employed with danger or possible risk to the structure of organs,—even the brain or spinal cord,—because, however high the voltage, the amperage is infinitesimal. Only judgment, tact, and patience are required to obtain generally satisfactory results.

Paralysis arising from a *specific cause*, as syphilis, calls for specific treatment, with a view to removing the gumma tumor that is supposed (rarely demonstrated) to be present, and the mixed treatment, or some other, may be followed by recovery. In such cases the administration of Franklinism for its nutritional effects, if for no other, is certainly beneficial.

The second general indication, to preserve the local nutrition of the parts paralyzed, and promote the general health and nutrition, requires attention from the onset of the affection, if an early and complete restoration is to be expected.

The maintenance of nutrition in health requires, in addition to a supply of nutritive pabulum, two things—the activity of the vital functions and a proper amount of activity of the motor mechanism. When either is interrupted, every part suffers.

If the action of the trophic centers in the cord, which are now believed to control the nutritive processes, is impaired, thereby complicating the paralysis, the part affected rapidly becomes soft and atrophies. In brain lesions, the trophic centers not becoming involved, the motor mechanism only suffers from disuse, and thereby only secondarily affects the general nutrition. In peripheral paralyses, if exercise of the other portions of the body is not thereby impaired, only the part paralyzed suffers.

If the general health of the individual is not good at the onset of an attack of paralysis, restitution will be relatively slow, and the utmost must be done to assist and even stimulate the normal activities.

We believe that, while the attention to diet, daily evacuations, judicious use of tonics, and regulation of exercise (when possible) are all important, no measure so well meets all the indications for improving or maintaining nutrition as static electricity. (1) It tends to preserve the balance of the nutrition of exercise and the nutrition of restoration, and thereby retards the process of degeneration. (2) The qualities of the currents are such that no unfavorable electro-chemical action takes place to impair the beneficial effects. (3) The effects are searching, penetrating, and potent; in which qualities it surpasses all other forms of electrical administration. (4) Applied with the patient insulated, local administrations are tonic and constitutional as well. (5) Local applications induce reflex actions in cerebral cases, acting as a *vis a tergo;* not performing the action for the part, as when it is massaged. In other words the normal relations of center, nerve, end plate, and muscle to action are preserved, pending a possible recovery, in which the masseuer fails, because he moves the limb while the parts are passive. (6) Contractures never take place during a course of electro-static treatment, nervous irritability is allayed, sleep promoted, and normal equilibrium preserved.

The static modalities of value in preserving and promoting nutrition are sparks (long, short, and friction), the wave current, and the brush discharge. No modality calls forth so well a healthy responsive reflex action as sparks, long and short, according to the indications—short sparks to small muscles, and larger ones to larger muscles and when a thick layer of fat overlays the muscles to be treated.

Over paralyzed muscles the applications should be numerous, not alone for exciting muscular contraction, but also to stimulate all local activities. For the same reason it is the writer's custom to make a thorough application of the friction sparks over the paralyzed areas. When anæsthesia is present, the friction sparks should be applied for a considerable time, after which in many cases partial or complete return of sensation will be experienced during the administration, to be followed later by partial or complete recovery. In paralysis of cerebral origin—peripheral paralysis—and in the treatment of tabes dorsalis sparks are of inestimable value.

The *wave current* should be applied, when possible, for its general nutritional effects, to every case of paralysis.

Its local application, when a spark-gap of at least four inches in length is continued for a period of twenty to thirty minutes, will preclude the necessity also of a tonic administration. The wave current is also indicated over local peripheral congestion and paralysis originating from affection of the cord, as previously shown. When the brain is the seat of the lesion, applications to the cervical region may be of some service. Except the scalp is shaved the wave current cannot be applied, and even then the writer's experience to the present time has derived no results that warrant its employment.

In the treatment of anterior poliomyelitis in young children, in addition to application over the spinal cord, we put up the affected limbs in a bandage of tinsel braid, and use the wave current, with a spark-gap just as long as can be used without inducing muscular contractions. It is best in these cases, we believe, unless the child is very small, to treat but one lower extremity at a time, but always both at the same sitting. When treating very small children it will be necessary to make use of a child's armchair, or to instruct the mother to hold the child, at the same time pressing the palm of the hand *constantly* against the outer metal surface of the electrode or braid—otherwise the mother could not hold the child, for the passage of spark through the clothing.

The *brush discharge* is valuable for its effect over areas of congestion and hyperæsthesia, for relief of pain, and as well, to a satisfactory degree, for its nutritional effects. It is the form of application *par excellence* to the scalp, and often affords great relief to an aching head.

The other modalities may be found of some value, but are, as a rule, not sufficiently effective to be indicated.

SKIAGRAPHY AND FRACTURES.

Mr. Golding-Bird has published a paper containing a clear statement of the advantages, the errors, and the drawbacks of the Roentgen rays in their application to fractures. The novelty of the method and its emphasis at first led the surgical world to accept it with enthusiasm and to submit on all occasions to its decisions. But difficulties soon arose. Appearances were presented in many skiagraphs which could not be accurately interpreted. The X-rays spoke in a strange language, and the dictionary of that language had yet to be compiled. Thus it was found that where functional, and even æsthetic, results were perfect, the skiagraph revealed not seldom a hideous deformity.

A few of the more ardent surgeons, desiring what has been aptly termed a piece of perfect "cabinet work" in the setting of the limbs, concluded that operative treatment by wiring, screwing, or the like was alone capable of giving complete satisfaction, and that, therefore, all or many fractures of the limbs must be treated by open operation. The tendency was, as Mr. Golding-Bird says, "to obtain a good-looking scar in the bone at the expense of an ugly scar in the skin." But increased experience has shown that functional and æsthetic results do not tally with the showing of the skiagraph. There is an "utter incompatibility of skiagraphic appearances with the actual functional results."

If this be the case, it becomes a question as to whether, or to what extent, the skiagraph can avail us in the treatment of fractures of the limbs. If there is a fracture with little deformity, and much bruising has resulted from the injury, clinical examination may be insufficient to reveal the full extent of the hurt sustained. A skiagraph may make accurate the diagnosis, and may perhaps be of advantage to treatment. We say, perhaps, deliberately, for such refinement in diagnosis, though desirable from the academic point of view, does not by any means imply increased satisfaction in treatment. The question might indeed well be debated as to whether, so far as treatment is concerned, the X-rays have not been rather a disadvantage than a boon, in that they may have led to frequent meddlesome interference with soundly healing limbs, because such limbs did not exhibit a desirable " cabinet-work setting " when viewed on the screen.

The medico-legal possibilities of skiagraphy are obvious. Here and abroad charges of malpraxis or claims for permanent damage and incapacity, based largely or entirely upon skiagraphic evidence, have frequently been brought before the courts. Perhaps the most interesting case yet decided upon the evidence of the X-rays is related by Wilmans.* A laborer asserted that he had sustained an injury to his foot from an iron bar while working. A little swelling about the inner malleolus was noticed. For many months the patient declared his inability to work, and claimed damages for permanent disablement. A skiagraph was taken and showed a fragment of bone behind the astragalus, and the condition was stated to be " fracture of the astragalus." The plaintiff was awarded by the court an annuity of one-third of his former wages. Some time afterwards the medical man who had attended him discovered him working without discomfort, and insisted upon a re-examination. On this occasion both feet were skiagraphed, and a similar condition discovered on the other side. The loose fragment proved to be the os trigonum.† The court happily revoked its former decision, and ordered the laborer to repay the annuity he had already received!

At a meeting of the American Surgical Association in 1897, Professor J. W. White of Philadelphia, in discussing the question of skiagraphy in general, said, " It is difficult to point to any one definite addition to our knowledge of these injuries (fractures), and, so far as I know, no material modification of the general rules governing the treatment either of fractures generally, or of any specific fracture, has as yet resulted." The debate upon this paper led to the formation of a Committee specially instructed to report upon the "medico-legal relations of the X-rays." The report of this Committee is the most important pronouncement that has, as yet, been made upon this subject. The Committee, while recognising the advantages of the skiagraph, clearly pointed out the need of expert testing of its records. They say: "There is evidence that in competent hands plates may be made that will fail to reveal the presence of existing fractures or will appear to show a fracture that does not exist," and "the appearance of deformity may be produced in any bone, and existing deformity may be grossly exaggerated." In urging the surgeon to make himself acquainted with the technique of the methods they emphasize "the wide experience with surgical injury and disease necessary for the correct reading of these pictures."

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* Fortschritte auf dem Gebiete der Roentgenstrahlen.

† The " os trigonum " is described in the Journal of Anatomy and Physiology of October, 1882, by Shepherd, as " a hitherto undescribed fracture of the astragalus."

The lessons we may gather from Mr. Golding-Bird's and other papers are chiefly the following: That it will be wise for the surgeon in all doubtful cases to suggest from the outset the desirability of a skiagraphic record, and at the same time to point out its fallacies; that the diagnosis of a fracture, though apparently facilitated by the use of the X-rays, may, however, prove faulty—a fracture being shown where none exists, or more rarely a fracture being missed; that the reading of the skiagraph should not be held of so much account after the fracture is set as the evidence given by careful examination of the limb; that is to say, if the limb be in good position and the bony outline regular, the skiagraph may generally be ignored; that a fracture is shown as still present for a few months, owing to the newly formed callus being transparent to the rays; that skiagraphy as an isolated test is worthless and not infrequently misleading, but, taken in conjunction with other signs, elicited by a careful examination of the limb, and read with understanding, is of value.

EPILATION.

In the Wiener medicinische Wochenschrift Dr. Herman Benedikt gives shortly the result of his experience in the use of the X-rays as a method of treatment, and writes that, notwithstanding the observations of the opponents of this method of cure, there have been many striking results obtained in the removal of superfluous hairs, and in the treatment of lupus and similar skin affections; and, in his opinion, too much stress has been placed on the amount of damage caused by the rays. When a patient comes up for treatment it is necessary to ask the following questions, and to note carefully the answers given, for the success depends in a great measure on the information thus elicited:

1. Color of the Hair.—Results are obtained much more quickly when hairs are light in color than when they are dark, but the individual with light hair is much more susceptible to dermatitis, and reaction is proportionately more easily produced.

2. The Position of the Hairs.—The part of the body affected is very important as regards the probable duration of the treatment required, as it is shorter when the hairs are situated on the cheek than when they are on the chin, and longer when on the chest, back, and extremities.

3. Previous Treatment affects the duration of the treatment, for in many cases electrolysis or other methods have been attempted which have rendered the skin more irritable and more liable to the manifestation of a rapid reaction.

4. If the skin becomes raw and rough on exposure to the cold, susceptibility and irritability must be expected.

When the color and position have been noted, and former treatment and susceptibility to cold ascertained, with ordinary precautions taken to prevent over-exposure, no harm should result.

The hair should fall out as soon as redness or a brownish redness—the first symptoms of dermatitis—is noticed on the skin, and treatment should be stopped for some weeks until the skin is quite normal again.

The time required for treatment varies in each particular case, and averages from twenty-five to a hundred sittings—that is to say, with six daily sittings in each week, from four to seventeen weeks.

In order to emphasize the manner in which the duration of treatment varies the author gives the particulars of three cases.

Case I.—Patient, aged thirty, with dark-brown hairs on each cheek, on the chin, and on the neck. These were of strong growth, and the skin was of a yellow-brown color, rough and thick. No previous treatment had been attempted. Daily sittings six times a week were given, for five weeks, of ten minutes' duration. After this some of the hairs fell out, and at the end of fifteen more sittings a brown-red coloration was observed, so after ten more sittings treatment was discontinued for six weeks, during which the hairs fell out in greater numbers, and the skin became more red and tense. After the interval ten more sittings were given—in all one hundred—and after another interval the whole of the skin was clear on the cheeks. After four months sixty further applications removed the hair from the neck, leaving the skin soft and tender.

Case II.—Patient, aged forty, fair hairs on the cheek, neck, and back; skin sensitive, and inclined to eczema. Had been previously treated by electrolysis, and the patient had shaved. The cheeks were treated, and after thirty sittings the skin became red, which redness during an interval of six weeks became brighter, and the hairs fell out. In contrast with the former case it will be noted that only thirty sittings were required, on account of the color of the hair and the skin.

Case III.—Patient, aged twenty-four, with very fine and soft hairs on the cheeks and neck, which were treated alternately. A lively reaction occurred after twenty sittings, during which the hair fell out. After an interval of three weeks further sittings were commenced, until forty in all had been given, with the result that complete epilation was produced. Occasionally two or three days' interval was allowed.

The author, therefore, expresses the opinion that epilation can always be effected with the X-rays; but no miracle must be expected, and both time and patience are required.

ON THE DIAGNOSIS OF THORACIC AND CARDIAC ANEURISM BY THE X-RAYS.

After mentioning that the greatest value as yet found for the X-rays in diseases of the chest, both as regards diagnosis and perhaps prognosis, and suggesting that it has almost become the duty of the physician to make use of this method of examination in any doubtful case, and mentioning that no two physicians seem to be agreed as to the relative value to be ascribed to the prominent symptoms present in thoracic aneurisms, Dr. Walsham, in the Edinburgh Medical Review, describes the apparatus and the exposure necessary in his opinion for the diagnosis of aneurisms of the descending thoracic aorta, for which he uses the lateral oblique method, giving a three-quarter view of the thorax. By this method two clear zones can be seen: one posterior, corresponding to the posterior mediastinum, bounded below by the convex shadow of the diaphragm, in front by the shadow of the heart, behind by the shadow of the vertebral column, which shadow includes those of the aorta, vena cava, and esophagus. This is termed the retro-cardiac triangle.

Another triangular space in front of the heart corresponds to the anterior mastinum. Tumors in these spaces can occasionally be seen, and thoracic aneurisms, esophageal tumors, or enlarged mediastinal glands seen. In the same way that familiarity in the use of the stethoscope, the ophthalmoscope, the laryngoscope, the cystoscope, and all special forms of examination, it is as well to know what the normal condition is like before attempting to interpret the conditions present.

It is not common to obtain a shadow simulating an aneurism at the junction of the transverse with the descending thoracic aorta, and, as in all X-ray examinations, it is as well to warn patients that dermatitis may be produced; although this result after exposure is almost a thing of the past, owing to the short exposures now required.

For the diagnosis of an aneurism the shadow must be in continuity with the heart or aorta, and the shadows cast by interthoracic growths present quite a different appearance. The shadow of the sac of an aneurism is more dense than the heart-shadow, owing in a great measure to the presence of laminated clot. Without this the shadow is naturally less dense. Considerable importance should be attached to the position of the heart in the chest, as in many cases the heart assumes a transverse position.

Cases of cardiac aneurism may be diagnosed in the same manner, but, owing to the rarity of their occurrence, considerable further experience is required before this means of diagnosis can be absolutely relied upon. The exposure necessary for the production of a good skiagram varies in different cases. Fat and muscular subjects require a very much longer exposure than thin and young patients, even when all the conditions are favorable, and the resulting shadow is often only visible to those who are accustomed to the frequent observations of similar shadows.

EPITOMES.

DYSMENORRHEA.

L. H. Dunning, M. D.: The treatment of obstructive dysmenorrhea is dilatation of the cervical canal. I prefer the use of the Palmer dilator, followed, if necessary, by the use of the Goodell-Ellenger instrument. In cases of flexion of the uterus it is well to use a Wylie stem pessary for a few days; being careful to observe all antiseptic precautions and to avoid all rudeness of manipulation. I am free, indeed anxious, to confess that, in cases of undersized flexed uteri, dilatation and other mechanical means have yielded me good results in but a very small proportion of cases. Here constitutional treatment and the local use of electricity have afforded the best results. The administration of apiolin has been of signal benefit in some cases, and the long-continued use of iron and arsenic has in some instances led to marked improvement, especially where there is anæmia. When electricity is employed, galvanism with the negative pole in the uterus has with me been most beneficial.

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ANEURISM OF THE THORACIC AORTA OF TRAUMATIC ORIGIN; TREATMENT BY INTRODUCTION OF WIRE AND ELECTRICITY.*

BY DE FOREST WILLARD, M. D.

Clinical Professor of Orthopedic Surgery, University of Pennsylvania; Surgeon to the Presbyterian Hospital, etc.

J. S., aged twenty-three years; male; injured in November, 1899, by a heavy box, weighing five hundred or six hundred pounds, which fell two feet, striking him upon the chest. He was unable to work for six weeks, but at the end of that time resumed his labor; complaining, however, of a tightness and pain in his chest, which he considered a heavy cold. He was able to work at intervals, though with difficulty, for more than six months, when the pain and pulsation of his chest, steadily increasing, disabled him. He was told at that time that his heart was injured, and he was put to bed. His cough soon became troublesome, and the pain in the chest was severe, especially at night. There was occasional expectoration of bloody mucus. Worked a little through the autumn. Admitted to the Presbyterian Hospital, Medical Ward, in charge of Drs.

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* Read before the Philadelphia Academy of Surgery.

Musser and Sailer, December 9, 1900, thirteen months after the injury to his chest. Married; one child; no history of syphilis; no palpable or visible change in arteries; only slight pulsation visible in neck; no tracheal tugging; no suprasternal pulsation along carotids, subclavians, or innominate.

Right Thorax Anterior.—Powerful distinct systolic uplifting over whole right thorax at each pulsation, most noticeable in thin area at junction of third and fourth ribs with their cartilages. Slight thrill. Right axillary vein distended. Respiratory sounds practically absent over right lung. Dullness, on percussion, over whole right chest. Systolic blowing heard from first interspace, downward throughout entire chest, and outward to axilla.

Left Side Anterior.—Violent heaving pulsation of heart's apex, diffused for three inches below the normal position. Loud systolic murmur and loud first sound over entire upper left thorax.

Posterior Right Thorax.—Decided pulsation visible, and palpable over entire right chest. Long, loud systolic murmur over entire area, especially loud at base. Resonance of lung only feebly heard. Has bloody expectoration; cough; dyspnœa.

Skiagraph taken, but not satisfactory.

Patient was put at rest, with large doses of iodide of potassium and restricted diet, for five weeks. Icebags for pain. Dyspnœa, pain, cough, and bloody expectoration grew steadily worse, and the anterior wall became perceptibly thinner. Pain increased, depriving patient of sleep, even under large doses of morphia.

The position of the tumor, the absence of pulsation in the neck, and the character of the chest sounds enumerated above, indicated a traumatic lesion of the descending thoracic aorta rather than of the arch or of ascending portion, unless the dilatation was at the very origin of the vessel. As the conditions were growing worse, and rupture certainly approaching, the patient consented to accept the risks of the only operation that offered any chance of success—the introduction into the sac of a certain quantity of wire as a framework or skeleton, each coil of which might form a nucleus for coagulation, producing eddies in the sac and final consolidation. To facilitate coagulation upon and around this wire framework, the coagulating power of galvanism was brought to bear.

Ligation was of course out of the question; in the ten cases in which the aorta has been ligated, the result has been uniformly fatal. Scarification of the interior of so large a sac was not hopeful, and the simple introduction of horsehair or catgut certainly did not offer as reasonable chance of success as did the more complete method advocated by Connadi, D. D. Stewart, and others. Simple galvanopuncture urged by Cinicelli, since it leaves behind no framework for a deposit of clot, was obviously less certain in its permanent results. The injection of about 300 cubic centimeters of a one or two per cent. solution of gelatin was considered, but rejected on account of the large size of the sac.

In this operation of wiring, it is essential that strict asepsis be secured, and that no elements of suppuration be introduced, since sepsis and faulty technique are the most frequent causes of death.

In order to protect the skin and subcutaneous tissues external to the wall of the sac from the destructive effects of the electrical current, a vulcanite cannula (size No. 7, French catheter scale) was constructed with a steel trocar (size No. 4, French catheter scale). The thickness of the vulcanite made the introduction difficult, requiring a slight nick of the skin with a scalpel. (A veterinary hypodermic needle, three inches long, and of caliber of 24, is better. It can be insulated by several coats of shellac varnish; best French lacquer set by heat, or by a porcelain coating.) The trocar was introduced in the fourth interspace, the thinnest point of the sac, just outside the costal cartilage, and was driven well into the sac. Upon the removal of the trocar a current of blood spouted three feet into the air at each pulsation of the heart, which, owing to the size of the cannula, made the loss of blood quite serious. It was, however, controlled by the finger until the wire was threaded in. Gold wire No. 35 had been procured, but proved entirely too fine, as it would not thread through the cannula without crinkling, and I was obliged to resort to silver wire No. 24. During the operation I fortunately had the benefit of the assistance of Dr. Guy Hinsdale, who furnished the following notes: "After six or eight feet had been inserted, the wire was connected with the copper conducting cord of the positive pole of a galvanic battery. The current was supplied by the electric lighting plant of the hospital, reduced by a current controller. A chloride of silver dry-cell battery does well. The negative pole was attached to a large, flat electrode sponge-covered pad, placed between the scapulæ. Five milliamperes were turned on at first, and the force of the current was increased by fives, the patient perceiving plainly each addition, and complaining of pain chiefly in his back, especially when new pieces of wire were connected. More wire was threaded in through the cannula until about twenty feet of coils were inserted. The strength of the current was increased until, during the last fifteen minutes of the hour, eighty milliamperes were measured; eighty-five only for a moment." In my judgment the current used was too strong, and if equally good coagulation will take place under one of moderate strength, the danger of burning the walls of the sac is lessened. Finney obtained his results with only ten to twenty milliamperes. Coagulation of the blood in the cannula took place very soon after the current was applied, preventing further hemorrhage, and, on withdrawal of the cannula, the wires having been pushed in as far as possible, there was no hemorrhage. The opening was closed with gauze and aristolated collodion, and the patient confined rigidly to bed. Aside from the first shock at the sight of the spouting blood, the patient suffered no serious inconvenience, save for the pain in the back, at the negative electrode, and talked cheerfully throughout the operation. He slept the greater part of the night, the next day was much better, and in five or six days was anxious to sit up, although he was not permitted to do so. The only burns were at two areas, of the size of peas, upon the back. The cathodal negative pad should have been of larger size. In a week he could with difficulty be restrained in bed; was eating and sleeping well; had no pain; was able to stop the use of morphia, and had much less oppression. The pulsation in the thorax was lessened at the end of the operation; was still less on the following day, and in a week was diminished at least twenty-five per cent. His statement is that he is "twice as good as before operation." The original point of thinning anteriorly is much more solid, but laterally below the axilla the pulsation is slightly increasing, and will probably require a repetition of the operation.

In the third week a dilatation of the sac outward into the axilla gave torturing pains in right arm for two days, but this pain was speedily relieved, although the pulsation in axillary region has increased, and I propose to repeat the operation. His sac may be multilocular, or the coagulum in one district may have altered the direction of the blood current, causing dilatation of a new area. Nine weeks after the operation the man was so well that he could not be restrained, and he left the hospital in spite of my earnest protest. Good consolidation of the anterior portion of the sac at the seat of operation was positive.

Abstract from notes by Drs. Musser and Sailer, on admission: "Temporal artery not visible; neck full, only slight arterial pulsation; resonance in both supra-clavicular fossæ; percussion resonance on right side beginning at eleventh dorsal spine, crossing to tenth rib at posterior axillary line; no distinct respiratory movements; vocal resonance and tactile fremitus greatly exaggerated, with broncho-vesicular breathing over the compressed lung which lay posteriorly near the spine; outside and anterior to this area, respiratory sounds very faint, or lost. Anterior thorax very prominent on the right side over level of fifth rib and over sternum to anterior axillary line. Vocal resonance entirely lost anteriorly; upper thorax anterior, first sound soft and blowing, second sound faintly heard. Left side anterior, apex beat at fifth space from nipple to anterior axillary line exceedingly powerful. Auscultation at apex, loud systolic murmur with first sound; faint diastolic shock and prolonged diastolic murmur. Fourth interspace, fainter systolic murmur, louder second sound, with prolonged diastolic murmur; third interspace, short fainter systolic, long soft diastolic sound; second interspace, dull rough systolic, faint and prolonged diastolic murmur. Aortic, faint first sound; loud, clear second prolonged diastolic murmur. Left lung, respiration normal at apex; vocal resonance slightly increased. Tympanitic resonance from fifth interspace to axillary. With this saccular aneurism of the ascending portion of the arch there is evidently an aortic insufficiency, with hypertrophy and dilatation of the left ventricle."

REMARKS.

Technique.—The size of the wire should be thoroughly graduated to the caliber of the needle, which latter should be tested to ascertain the smoothness of its bore, as it is essential that the wire should slip easily through it. I see no practical difference between silver, gold, and platinum wire. Size 27 to 30 is probably about the best diameter. Finney uses silver alloyed copper, 75 copper to 1000. This, when drawn down from No. 8 to No. 27, makes a close coil, is very pliable, and corrodes moderately with galvanism. Stewart, who has given careful attention to this subject, found that iron wire was undesirable, for the reason that the passage of the current rapidly decomposed it and liberated iron chloride and oxide in such quantities as to be dangerous if washed into the vessels, with a probability of causing thrombi. Steel wire coils better than silver, but is too stiff, and may injure the sac.

The amount of wire should be regulated by the size of the aneurism, its object being to form a skeleton for a clot; the amount should be so regulated that it will fully reach all portions of the sac, for which reason it should be previously wound so as to coil and snarl in different directions. The wire for a large aneurism can be wound upon a sterilized rolled towel, so as to make large spirals in the sac; for a smaller sac, it should be wound upon a glass or spool; in either case it should be carefully arranged and prepared so that there will be no delay or kinking during the process of feeding the wire in through the cannula. If the wire kinks, other needles may be inserted at different points of the aneurism, all the wires being attached to the positive current. The arrangement of the coils can be well observed by feeding the wire into a glass flask. If the wire is properly wound before operation, it is very improbable that the initial point will strike the opposite wall. If too large a quantity is used, pressure upon the sac from within might cause ulceration and rupture, and might also interfere with contraction of the sac; moreover, if coils lie against the wall and the current is too strong, the sac may be burned. Moore used as high as 108 feet, and Abbe, 150; Roosevelt introduced 225 feet of steel piano wire, applying a galvanic current of twenty-five milliamperes for thirty minutes. Probably five to twenty feet would be the proper amount.

It is very important that the tissues be protected from the galvanism, lest an open sloughing track be made into the aneurism. For insulation of the needle, glass, sealing-wax, caoutchouc, etc., have been tried, but best French lacquer or varnish, set by heat, seems best. Lacquer will not stand boiling nor soaking in a carbolic solution, but it can be thoroughly sterilized by dry heat carried up to 300°, then wrapped in a sterilized towel. A long veterinary hypodermic is better than a trocar and a cannula, even of same size, since the wire can be inserted half-way into the needle before the puncture is made, and assists in controlling primary hemorrhage when the needle is inserted.

There is always risk that the wire may enter the aorta, as has happened in several cases, and minute or larger clots may be washed off and form emboli.

Traumatism as a cause of aortic aneurism is not largely mentioned by authors, although cases are reported by Lancesi, Munro, Sanson, and others, even where the arteries were normal.

Traumatic aneurism of the thoracic aorta is rare (Brown of St. Bartholomew's Hospital found only eight among 228 aneurisms), since it is better protected than most of the vessels, and the arch is more liable to atheromatous degeneration.

Riesman reported a case in which there was limitation of motion in the spinal column, with no tenderness over the vertebral spines, but with torturing pains. An exploratory incision was made over a tumor in the back, but finding that the tumor pulsated violently, the operation was wisely abandoned and the wound closed; the aneurism burst, later, into the left pleural cavity.

A traumatic thoracic aneurismal sac may leak slightly, as in the case which I reported in which a man sixty-four years of age was injured by a bale of carpet weighing three hundred pounds falling upon his shoulders. He lived two days with a rent in his thoracic aorta one-half inch long. The outer coat or adventitia, however, was not perforated. The inner and middle coats having been torn, the blood dissected its way between the muscular layer and the outer coat throughout the entire extent of the thoracic aorta, and down the abdominal for five inches. The only symptom was the intense pain in the thorax and back, aggravated by every movement; this pain slowly extending from thorax to abdomen. There was no cough. On the second day the outer coat gave way about one inch below the original rent in the inner coats, and the patient died in a couple of minutes from the gush of blood which entirely filled the left pleural cavity. The arch of the aorta was not atheromatous, and in the thoracic aorta the only point of visible atheroma was at the area which gave way.

In aneurism of the thoracic aorta there is usually urgent dyspnœa and a sensation of distress and fullness in the chest. In time there is nearly always an erosion of the bodies of the vertebræ, and a rupture may take place either into the mediastinal connective tissue or into the pleural cavity.

Stewart, Hershey, and Hunner report twenty-three cases treated by this method, and my own makes the twenty-fourth.

In summing up the records we find that permanent cures have been few, as must necessarily be the case in so fatal a condition as aneurism of the aorta, yet in one-half the cases operated upon life was certainly lengthened, and all of those who survived the immediate effects were rendered vastly more comfortable. This result is certainly satisfactory when the fact is taken into consideration that these cases were necessarily fatal ones, if untreated.

Ten cases undoubtedly had their lives shortened by the procedure, but several of the patients had fusiform aneurisms and were not proper subjects for the operation.

Rosenstirn's case was alive eleven years after the operation. The post-mortem of one of Stewart's patients, made three and one-half years after the operation, showed a solidly coagulated tumor. Kerr's case at the end of ten months showed no signs of the aneurism. In Noble's patient all symptoms had disappeared, and another patient died of dysentery nine months after the operation. Finney's fourth case was at last report living, with great improvement in symptoms. My own patient at nine weeks is too recent to permit of any conclusion, save that great comfort and relief from pain and dyspnœa have been secured.

Ten cases then have been positively benefited, one is uncertain, and while the remainder died at various periods within a year, yet nearly all of those that survived the immediate effects of the operation were rendered decidedly more comfortable.

This method, therefore, of dealing with a most serious condition seems to offer a more reasonable hope of success than any other plan at present discovered.

THE HIGH-FREQUENCY CURRENT AND SOME OF ITS USES.

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I approach this subject with much caution. There is nothing in electro-therapeutics concerning which there appears to be more uncertainty regarding its efficiency than the high-frequency current. In France great claims are made for it, but in Germany it is largely discredited, while England and America may be said to be in the position of observers.

But before we proceed, let us understand what is meant by the high-frequency current. The sinusoidal current is often termed a high-frequency current. The discharges from the terminals of a static machine are also often spoken of as high-frequency discharges. Both of these are, to a degree, high-frequency currents, but that form of current of which I am speaking to-day is produced only by the discharge of a condenser through an inductorium. This discharge produces a high rate of alternations, the characteristic of which is that it disappears rapidly, that is, the amplitude of the alternations is much greater at the first moment of the discharge and disappears very rapidly. As has been stated, this is produced by the discharge of a condenser through an inductorium. The discharge from a pint-sized Leyden jar through a small inductorium will produce much higher frequency of oscillations than would a discharge from a quart-sized Leyden jar through a correspondingly large inductorium. An idea may be had of the enormous rates of these oscillations, when it is estimated that the discharge with a Leyden jar of a pint size, when only a short, thick wire is used to connect the internal and external coatings, is fifteen million of periods per second. Now, if a larger Leyden jar is used, and with a correspondingly larger inductorium, while the rate of oscillation is much less frequent, the amplitude of these oscillations is very much greater.

This inductorium is an apparatus composed of a primary coil, through which the discharge from the Leyden jars pass, with an outside coil separated from the primary coil by means of a cylinder of glass. As these are very high-potential currents, it is essential that this glass be of the best quality, so as to prevent sparks from passing from one coil to the other. These Leyden jars may be charged from a static apparatus, or from a coil, or from any other source which gives off a charge of sufficient potential. As most electro-therapeutists possess a static apparatus, this is easily managed. As the jars become charged with a sufficient electromotive force to overcome the resistance of the air-gap a spark passes, emptying the jars. This releases the charge from the outside coating, which rushes through the conductors to the primary coil. This coil is made up of only a few turns of wire, and the secondary coil, which is wound over it, is composed of only a few more turns than the primary coil contains. This, it will be seen, acts very similiarly to the ordinary inductorium or faradic coil. The change here in the electromotive force, or the variation of the electromotor force in the primary circuit, which is accomplished in the faradic apparatus by the vibrator, or rheotome, is accomplished here by the spark gap.

Now, with every discharge at the spark gap there is a corresponding discharge of alternating or high-frequency currents from the secondary coil, and it is these alternating currents which make up the high-frequency current and which we utilize in medicine.

Regarding the physiological action of the high-frequency current there has been much controversy. There is probably a difference in the action, both physiologically and therapeutically, and especially in the depth to which the current penetrates, depending upon the amplitude of the vibration. If there is a very large condenser used and the inductorium be correspondingly large, the rate of vibrations will be small, but the amplitude of the vibrations will be large, and it is probable that these produce deeper-seated effects than do those from the small jar and small inductorium.

That the high-frequency current does actually traverse the body is proved by the old and simple experiment of placing the ends of the conducting wires leading from the two poles of the coil into the right hands of two men; when they grasp the terminals of an electric lamp with their left hands, the film glows brightly, yet the men feel no shock and scarcely any sensation. Various explanations have been given to account for this phenomenon, but they are as yet so faulty that it is not worth while to repeat them here.

There are certain other physiological effects. If an electrode connected with one of the poles of the coil be placed on the back of the hand, although crackling, radiating streams of electrical discharges are both seen and heard, no sensation is felt. If, however, the electrode be allowed to remain there for some time, a deep redness of the skin will be produced, and this will remain from ten to twelve hours. If the electrode be removed an inch from the hand sparks will pass, producing a decided sensation. It must be admitted, though, that, therapeutically, the high-frequency current is as yet largely used empirically. It has been claimed that the high-frequency current remains on the surface and only affects the skin. While this is true with metals, the comparison cannot be carried to the human body. The same has been claimed many times in regard to static electricity, but it is very easy, by the discharge of a static spark, to reach the deepest-seated motor points in the body, as evidenced by the vigorous muscular contractions which are produced. I have been able to produce muscular contractions of the peroneal and anterior tibial muscles by stimulating the motor point of the peroneal nerve back of the head of the fibula. On this point I will also quote from the well-known authors, Houston and Kennelly.

"It has been suggested," say they, "that alternating currents of such high frequency would be unable in traversing the human body to penetrate more than a very moderate distance below its surface, and that, therefore only superficial portions of the body could be directly affected by the discharge. Owing, however, to the feeble electric conductivity of the materials of the body, this skin effect or tendency of the current to seek the outer layers to the exclusion of the inner layers is comparatively small at the frequencies which can be practically produced, for while the depth to which such currents would penetrate in good conductors, such as copper wire, is very small, yet in the case of comparatively high-resisting materials, such as those constituting the human body, the penetration would probably extend practically through the entire mass. High-frequency alternating currents are, therefore, powerful but painless currents and are probably attended by electrolytic effects in the entire mass, although, as in the case of all alternating currents, little, if any, accumulation of electrolytic materials can take place."

Next, as to the method of administering the high-frequency current: There are two general methods, one of which is local, the other general, in its form of application.

The local method of application is made by means of an electrode constructed of a piece of glass tubing mounted on a hard-rubber handle. This glass tube, which is closed at the extreme end, is lined with tin-foil like a Leyden jar, and to this is attached by means of a binding post the rheophore leading from the coil. The surface of the glass tube is placed against the top and crackling discharges are at once produced, though no special sensation is felt. When, however, the electrode is removed a short distance away, slight sparks pass which are perceptibly but not disagreeably felt. The same is true when the electrode is placed over the clothing, as here the spark must pass through the fabric.

It is claimed that in this application the patient is electrically the outer coating of a Leyden jar, and that he is charged and discharge by influence charges. It should be remembered, though, that the high-frequency current is an alternating current, and that the coating on the inside of the glass electrode is charged alternately with positive and negative charges up to the millions of periods a minute, and the influence charge upon the patient must also be alternating with the same frequency. This form of application produces a vigorous effect on the skin, and it is claimed that it is useful in certain skin diseases.

Another form of electrode consists of a vacuum bulb about equal in vacuum to the Geisler tube, the outside of the tube being connected with the rheophore. The discharges from the coil cause this bulb to light up with a brilliant fluorescence, and charges are induced by influence on the outside of it. If the bulb is placed in contact with the skin, there will be a brilliant display of electric discharges, but no sensation is felt. As with the other electrode, when it is withdrawn a little, sparks pass.

Treatments given with this electrode are milder than those given with the glass-lined electrode, and it should be used over very sensitive spots.

With these local treatments, the current will be strongest when the patient is connected directly with the other or inactive pole of the coil, such as holding an electrode which is connected with that pole in the hand; more moderate when the inactive pole is simply grounded by connecting it with the floor, and least of all when it is not connected with anything. The most even and effective treatments are given when the inactive pole is grounded. When, however, very sensitive parts are to be treated, it is best not to ground the inactive pole, and when a correspondingly vigorous treatment is desired, the patient may be connected direct with the inactive pole. The general method of treating these patients is to connect one pole of the coil to the patient, while the other is attached to a large metal plate and held a short distance away. By this arrangement the body of the patient and the metal plate form the two coatings electrically of a condenser, the intervening space being the insulator.

A metal cage has also been made so as to let down over and around the patient. This gives a more general treatment than the plate. In France a couch has been constructed which has a large metal plate underneath. On this plate lies some insulating material, and on top of this the patient rests; one pole is connected to the plate while the body is connected with the other. The entire body, by this means, is brought under the influence of the charge and there is a constant charge and discharge both direct and by influence throughout the entire body.

When we come to the therapeutic use of the high-frequency current, we must admit that there is a great deal yet to be learned. I have myself succeeded in producing a healthy base in a very unhealthy ulcer by the discharges from the glass-lined electrode. This may be due, however, entirely to the ozone or free oxygen which is set free by these discharges. I have also succeeded in curing one very obstinate case of neuralgia, which involved nearly every one of the intercostal spaces, and centered with great severity and persistency over the solar plexus. This case had resisted all forms of treatment, both medical and electrical. The static breeze produced slight amelioration, but it was only slight. The high-frequency current was applied with a glass-lined electrode over the back, over the nerve roots, over the entire chest, and especially centered over the solar plexus. It required only nine treatments at the rate of three a week to entirely relieve this patient.

I would like to add just here that the popular idea that no matter how sensitive a part may be there is no danger of aggravating it with the high-frequency current is a mistake. By using the glass vacuum electrode and without grounding the inactive pole, and making the applications directly upon the skin, that is, not leaving any chance for a spark to pass, it may be used in the most sensitive cases, and this has been of great use in my hands in curing one case of a very severe and sensitive supraorbital neuralgia, which had resisted all other forms of treatment. But, on the other hand, a case of slight inflammation of the sheath of the tendon Achilles, which was doing fairly well under the static breeze, was greatly aggravated by applying the high-frequency current with the inactive pole grounded, using the glass-lined electrode and holding it about one-half inch from the surface, therefore giving sparks about one-half inch in length.

There has been an apparent success with this current in my hands in a form of disease in which I little expected it, and that was a very chronic case of rheumatic deformans. The patient had suffered with more or less arthritic pains, accompanied by deposits in every joint, for the last fifteen or twenty years. He had finally reached the point that he was no longer able to work, and last of all his hands became about twice the size that they were normally. Every joint, carpal and metacarpal, was involved. He was unable to close them sufficiently to hold anything in them, or even to button his clothing. He was a dreadful specimen of this terrible disease. I began treating the hands simply with the high-frequency current, using the glass-lined electrode, and giving sparks about one-half or three-quarters of an inch in length. The hands were showered with these sparks for fifteen or twenty minutes, three or four times a week. They were the last to be affected, and consequently, I reasoned, would be the first to show signs of improvement, and therefore I selected them for treatment. However, they had been in a useless state for five months when treatment was begun. To my surprise they decreased in size so rapidly that I began to feel the deposits in them were not of the same character as were in the rest of the body. They became more limber; he was able to button his clothing, finally able to close his hands. I then concentrated the treatment upon a knee joint which had been enlarged for more than two years and which was accompanied by some contraction of the hamstring muscles. I found, also, that this joint decreased, and that the pain and soreness and stiffness decreased in proportion to the decrease in the size of the joint. This is the only case of rheumatic deformans in which I have given the high-frequency current a fair trial, but I propose to continue investigation in this line. Just why it should relieve such a condition I do not pretend to say; in fact, was surprised at the result. One thing is noticeable here, and that is the action seemed to be purely local, results being obtained only on the parts that were treated.

When we consider the enormous rate of vibrations which take place with these discharges, we cannot tell what may be the result upon the nutrition, upon those forms of deposits which have a lower rate of vitality than the normal tissues have, such as these deposits certainly do have; and, last of all, what results it may have upon the circulation and circulating fluids.

Doumer and others have treated numerous cases of fissure of anus with uniform success as follows: The electrode is carefully introduced sufficiently deep to include the whole of the sphincter muscles. The violet sparks are then applied for from five to eight minutes. He claims that improvement is usually rapid; the pain gradually diminishes, the fissures become cicatrized, and spasms yield readily. He also claims that he has treated gonorrhea very successfully. His method is to carry the current to the part by inserting an instrument into the canal, or a glass-tube electrode located on the perineum. Excitation at once diminishes, nocturnal troubles disappear, œdema decreases, and while the discharge keeps up sometimes he has seen a cure in ten or twelve days. He claims that in epididymitis and prostatitis the results are marvelous. They yield to a single application, improve at the end of three or four minutes, and next day there is no pain it all. Oudin has reported numerous cases of eczema and psoriasis cured in a remarkably short time by high-frequency discharges. I would say that it is generally admitted by all who have used this form of electrical manifestation that it has a great future before it in the treatment of heretofore incurable skin diseases.

I might go on citing hundreds of cases cured by this form of electrical manifestation, for, while it is yet new to the field of electro-therapeutics, its popularity is so great with all who have used it that hundreds of cases are already on record, but time will not permit. I therefore leave the subject to you for general discussion.

STATIC ELECTRICITY—THERAPEUTICS, MODES OF ADMINISTRATION, AND SKIAGRAPHY.*

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CHAPTER XII.

PATHOLOGICAL MUSCULAR CONTRACTIONS.

Muscular contractions are induced by stimulation or irritation of a nerve center, axis cylinder, or the end plate,—centrifugal or centripetal,—and are voluntary or involuntary. The voluntary contractions, subject to the will in certain instances, from habit and without manifest source of irritation in neuropathic individuals, become involuntary, as is the case in one type of convulsive tic, usually amenable to suggestive treatment. The involuntary contractions are reflex in character, and comprise those which act in performance of nature's normal functions governed by special centers which control the natural processes of life, and those which arise from central or peripheral pathological conditions.

Muscular contractions classified by symptoms may be divided into spasms, contractions, and tremors. The first may be subdivided into two types, clonic and tonic. Clonic spasms are characterized by alternate contraction and relaxation of the muscle or group of muscles affected. Tonic spasms are those in which the action of the stimulant is constant or recurrent, with a frequency that maintains the muscle in a state of fixed contraction. When clonic spasms are general, they are known as convulsions. A contracture may be defined as a condition in which the contraction of a muscle or a group of muscles maintains a limb in a fixed condition of some degree of flexion

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or extension. Tremor is a condition of slight recurrent contraction, physiological after exertion or fright, or pathological under certain abnormal conditions.

The *indications* are, as in all cases, the removal of the cause—either an existing source of irritation, when present, or a nervous susceptibility which permits undue reflex contraction when under normal conditions they would not be induced.

The *prognosis* in all cases will depend upon the chronicity of the case, or the organic character of the lesion, as concerns the central nervous system.

Peripheral affections, when not of over two years' standing, as a rule are capable of being cured, but often require patient application. In accord with the rule in all affections, the time necessary to effect a satisfactory result, other things being equal, is in proportion to the time which the condition has existed. In cases of central origin, if the affection is functional, from whatever cause, the prognosis again is favorable in proportion to the chronicity. The history of the case and the careful differentiation and diagnosis must afford the basis of prognosis.

The *treatment* of these cases by the high potential electrical modalities, associated with hygienic and tonic measures in cases of non-specific origin, offers effective means of relief.

In these, as in the pathological conditions considered in the preceding chapters, such favorable results are due to (1) the constitutional tonic effects; (2) the local effects upon inflammatory (irritating) conditions; and (3) the sedative effects upon overwrought nervous conditions. The general principles of administration apply here as in other affections, but some special features of method call for consideration.

EPILEPSY.

When not due to traumatic causes, but occurring in children of neuropathic parentage, very much can be accomplished to prevent it from becoming established by removing all irritating influences, correcting diet, and employing systematic administration of static electricity, both for its general tonic effect and for the relief of nervous irritability. The wave current is the choice of modalities in these cases. Place over the abdomen or back a metal electrode having a surface of about sixteen square inches. The administrations should be daily, or every second day, for a period of not less than twenty minutes, employing a spark gap of from two to five inches, according to age or condition of the child. This course should be kept up for at least a year, or longer if there is improvement, but a disposition to recurrence. If no lessening of frequency is noted after months of treatment, continuance will as a rule be of no avail.

CONVULSIVE TIC.

Very many of these cases are habit cases, induced by some trivial local source of irritation or reflex influence not of central origin. In such, static electricity plays a double rôle, and is uniformly successful if applied early. (1) It lessens the irritability, and (2) acts as a powerful suggestive influence when systematically employed.

Most cases of central origin are not due to any traceable organic defect, but are induced by functional derangement. Such are capable of being cured if not of too long standing. For treatment apply a metal electrode covering the affected muscles, and held in position with the hand, and employ the wave current with as long a spark-gap as can be used without causing painful muscular contractions. Sparks to the region will also render the results more effective in some cases. If the condition is suspected to be of central origin, a large electrode to the back or abdomen should be used, as in epilepsy, for an additional fifteen minutes for its general effect. Under this régime there are few cases of not more than two years' standing that will not yield.

BLEPHAROSPASM

May be considered in the same category with convulsive tic, and treated in the same manner locally. It may be necessary, in making the application over the eye, to take off the ground chain when using the wave current. In this be guided by the patient's sensation. With the ground chain in position it will not be possible to use a spark-gap of more than one-quarter inch, which, during periods of humidity, will discharge the machine. An advantage with sensitive patients in using the current with the ground chain removed is the fact that the increase may be made by insensible gradations, and without causing unpleasant shocks to the patient. When using the grounded current, lengthen the spark-gap with the greatest care, to avoid unpleasant (not dangerous) sensations to the patient. This is best accomplished by a screwing movement with the hand upon the handle of the discharging rod.

CHOREA.

In chorea we have to deal with a neuropathic condition in many respects analogous to epilepsy. The treatment is essentially the same, except that the administrations should be as in an acute disease—daily, for at least twenty minutes. In this disease the specific remedy, arsenic, is indicated, and should be used in conjunction with the tonic sedative, static electricity.

HICCOUGHS.

For the treatment of this often distressing and dangerous affection, apply a metal electrode having a surface area of sixteen to twenty square inches over the diaphragm, open the spark-gap gradually four to eight inches, and it is surprising how promptly the spasms are interrupted. Continue the administrations from thirty minutes to one hour, and repeat the treatment daily, or oftener, if the paroxysms recur.

THE OCCUPATION NEUROSES.

These affections occur as a rule in neurasthenic patients, or those of strong neuropathic predilections.

The indications for treatment therefore are constitutional as well as local.

The prognosis generally depends upon the common rules governing chronicity. Not every case will be cured.

The modus operandi is practically the same in all cases, and the different types will, therefore, be treated collectively.

Whether the sufferer be writer, typewriter, pianist, telegraph operator, or barber, it will be the flexor group of the right hand which is affected except in left-handed persons. While the writer has cured patients suffering from the affection without interrupting the occupation, it is not the best plan, and, in cases of longer periods than a few months' standing, should not be considered. In all cases employ the tonic treatment, with the wave current for its constitutional effects, for at least twenty minutes, and thereby relieve the general nervous irritability and improve the processes of general nutrition. For this purpose the spinal or abdominal electrode and a three- to six-inch spark-gap are indicated. Locally a liberal application of short sparks (one inch) to the muscles of the forearm and ball of the thumb, followed by friction sparks, serves the best purpose. Their action is to improve local metabolism and nutrition, stimulate normal reflex action, and, with rest, or very moderate use of the parts, will effect a cure in most early cases, and is the best measure in all cases. In the stubborn cases the wave current may be employed, either by applying the tinsel braid or by placing the arm in a water bath for a period of fifteen minutes. The administrations should be made daily until a cure is effected, or the treatment abandoned.

CONTRACTURES.

These conditions are secondary to central or peripheral stimulation constant in character, or to paralysis of approaching muscles, and curable in most cases if treated before the structural changes which eventually shorten the muscles are not too far advanced. Whenever an inflammatory process persists for a length of time in the structures of a movable joint in any part of the body, groups of muscles which control the action of that joint become contracted, and the limb becomes fixed in extension or flexion, because long-continued irritation of the nerves induces contraction of the muscular filaments. If the condition has been present for only a few months, the prognosis is excellent and the condition will be relieved when the inflammatory joint affection is cured. (See Treatment of Joints.) At the time of treating the inflammatory joint affection, apply sparks liberally along the course of the contracted muscle, which means serves better than any other to overcome muscular contraction.

In addition, employ systematically therapeutic exercise. In cases which cannot be induced to submit to sparks, the wave current will succeed, but requires a longer time to accomplish the same result. Contractures occurring with paralysis may be prevented, if treatment is initiated while the muscles may still be extended, by gentle manipulation. In anterior poliomyelitis (q. v.), either electricity or orthopedic measures will prevent contractures. The objection to the constant use of fixation braces is that a degree of early restoration which is often possible is prevented, and the opposite group of muscles atrophy, as well, to an extent from which they will never recover if restrained throughout the period of development. If the orthopedic appliances are used, there should be a considerable period of each day during which the muscles should be exercised, and the wave-current or sparks (preferably the latter) should be administered at least three times weekly. (See Treatment of Paralysis.)

Contractures in hysteria, like the condition itself, yield to static electricity as they do to no other method of treatment. Sparks applied directly to the contracted muscles, or, when not tolerated by the patient, long administrations (twenty minutes) of the wave current, as strong as it can be given without causing painful muscular contraction, will succeed, but not so promptly. Contractures associated with other affections, as paralysis agitans, lateral sclerosis, cramps, etc., etc., should be treated on the same general principles, and the prognosis will vary with the chronicity of the affection and the organic nature of the primary lesion.

ATHETOSIS.

This condition often follows hemiplegia in childhood, and is characterized by varying degrees of irregular tremor of the hands and feet, and inability to retain the fingers and toes in a constant position. The prognosis in these unfortunate cases is never good. The lesion is fixed and central, and while others have reported relative success from electro-therapeutic treatment, the writer has never known a case to improve. If an effort is made, it should be along the same lines as in other spasmodic cases, and but little encouragement should be given.

TORTICOLLIS (WRY NECK).

Contractions of the muscles of the neck may arise from myalgia or other source of local irritation, or the affection may be congenital. The former yield very promptly to sparks, the brush-discharge, or wave current, if treated before a chronic condition of muscular shortening is established. The congenital cases are, as a matter of course, not improved by any but surgical measures.

SPASMODIC TORTICOLLIS.

Up to the present time no central lesion has been discovered that could be associated with this painful affection, and until recently the prognosis has been grave, and is to-day in cases of more than two years' standing. If, however, these cases are treated in the early stages by the high potential modalities, few indeed may not be satisfactorily cured.

The neuropathic tendencies so often present in these patients necessitate the adoption of the constitutional, as well as the local, methods of treatment at once, as we do in epilepsy, chorea, and the occupation neuroses. The wave-current alone will succeed in very many of the early cases; but sparks will be invaluable in the treatment of cases of a few months' duration.

TREMORS.

These signs of lessened nerve force may be due to alcoholic or other excesses, overworked mental or physical conditions, or organic disease of the central nervous system.

The prognosis depends on the ability of the patient to correct the habit in the early stage, the chronicity, and the character and stage of the organic disease.

The treatment is the removal, if possible, of the cause, and the employment of constitutional and local measures indicated.

In most of these cases the daily administration of the usual tonic application of the wave current for from twenty to thirty minutes, followed by a mild general administration of short sparks, closing the treatment with a rapid application of friction sparks to the whole body, will be most effective. This plan of treatment will meet the requirements satisfactorily in cases due to functional derangement, and greatly benefit, but not cure, the cases of paralysis agitans, multiple sclerosis, and often relieve fibrillary contractions of progressive muscular atrophy.

ASTHMA AND HAY FEVER.

These affections belong to the neuroses, and are more often acquired than inherited, though unquestionably there is an inherited predisposition present in very many cases.

Few, however, who have it in childhood are afflicted in later years; while on the contrary those who acquire the disease in adult life are rarely cured, except by removal to some climate adapted to their own case, if such they are so fortunate as to find.

The writer, during the past few years has been so favorably impressed with the results derived from the wave current in the treatment of these cases that he has reason to hope that patients may be made comfortable or cured by the means. Especially is this true of asthma. A patient is relieved most promptly of the paroxysm by the administration of the wave current.

Place a metal electrode having an area of from twenty to thirty square inches over the chest in front and open the spark-gap from four to ten inches, and continue the administration for thirty minutes. The amount of relief afforded in most cases is surprising, as well as the period for which the relief continues. Enough evidence has not been collected at this time to furnish any definite assurance that the results are more than palliative. The relief derived, however, warrants its use, and there are good reasons to expect that time will demonstrate cures in many early cases.

CHAPTER XIII.

STATIC ELECTRICITY IN DERMATOLOGY.

Although this field is relatively new, it is already practically demonstrated that in the wave-current and brush-discharge we have two most valuable means of relieving many stubborn skin affections.

The actions of the two modalities in relief of these diseases are both local and constitutional, but vary materially in their respective effects.

The wave-current induces active local secretions, stimulates local metabolism, improves the nutritive processes, and at the same time provokes an active elimination of effete and irritating accumulations. The glands become active, and the circulation and other conditions are restored to the normal when only functional derangement exists.

The brush-discharge is especially valuable for its remarkable destructive effect upon germ life, due largely to the local oxidizing action of the ozone set free at the surface of application, but more particularly, we believe, to the violet rays manifestly present and to which the methods of Finsen and other recent writers attribute the results derived from solar light and the Roentgen ray.

The actions of the brush-discharge from the static machine, or the high-tension coil of the transformed street current, are (1) local destruction or micro-organisms; (2) stimulation of normal metabolism; (3) diminution of local œdema and congestion; (4) relief of local pain and pruritus; (5) secretion and excretion are seemingly promoted.

The effects upon the local conditions, when ulcerations are present, are to promote healthy granulation with a minimum of scar and to an extent unprecedented by other measures in the treatment of these conditions. The newly formed skin is even and of the texture of a young child's. When applied to carcinomatous ulceration it removes fetor, relieves painful sensations, and greatly improves superficial conditions. When hyperæmia, swelling, or œdema is present, they are relieved to a remarkable extent, often by a single administration, and soon the local lesion in a large variety of cases disappears.

The local actions and effects suggest its application to a large variety of skin diseases—in few indeed does it seem not to be indicated.

During the past year there have been various forms of apparatus in vogue and employed with success. The step-up transformers connected in the circuit of the static induced current, by which series of short, painless sparks may be administered from either end of the coil, or a brush-discharge from an electrode consisting of a glass tube closed at one end, lined with tin-foil, is advocated by Dr. Henry G. Piffard of New York.

The brush-discharge, derived from one side of a street current transformer, employing high-vacuum glass electrodes, is used by Dr. G. Lenox Curtis of New York in the treatment of lupus and carcinoma, with most encouraging results.

The brush-discharge of negative insulation from the static machine, employing a wooden electrode (soft maple), in the hands of Dr. J. D. Gibson of Birmingham, Ala., has cured in twenty administrations a stubborn case of lupus vulgaris covering fully one-half of the face.

It seems not to matter from what source of sufficiently high potential the brush-discharge is derived, the results, as would be expected, are practically the same.

The writer for two years past has employed the brush-discharge from the soft-maple ball electrode to the treatment of lupus vulgaris, eczema, herpes zoster, hives, numerous erythemas, and acne with unqualified satisfaction.

In so many diseases of the skin the local manifestation is the indication of a constitutional derangement, resulting from organic functional inactivity, that in all cases in which the affection is not entirely local, excepting the specific exanthematas and syphilis, the constitutional static treatment proves of certain value, as would be expected.

The method of employing the brush-discharge in these cases is essentially the same as in other conditions, and practically the same to all local affections.

The time devoted to the administration, and the intensity of the application, must depend largely upon the experience of the operator, and will be varied in individual cases. The administration, however, must be thorough and necessary time not cut short.

The intensity of the application may be varied by the speed of the machine, the distance from the surface at which the electrode is moved about, the presence or absence of a direct ground connection, the distance at which the ground connection is held from ball or point of electrode, and the material and character of the electrode. If a wooden electrode is used, much depends upon the quality of the wood. The grain or texture should be uniform, and possess poor conducting properties. Soft maple and whitewood are the proper substance, and may be varied by wetting the end from which the application is made. The form of the electrode will vary the character of the discharge. From the round ball it is coarse, and causes a sensation as if hot sand were thrown against the surface. When the point electrode is employed the discharge is fine, soft, and agreeable, but the desired effect is derived at the expense of time. The point electrode is indispensable in administrations in clefts, as between the fingers.

The glass vacuum tubes, upon which patents have been unjustly granted (a Geisseler tube should not be patented), are of no advantage over any other glass tube filled with some resisting material, which, however, must not be an absolute non-conductor. The writer makes use of an electrode of turned soft maple, over which a test-tube fits, and provided with a handle at least one foot in length, having a screw eye in the extreme end for attaching the ground chain. This may be employed either with or without the test-tube in position, and the resistance (corresponding with the different degrees of vacuum of the Geisseler tube) varied by holding the ground chain within the hand upon the handle at different distances from the surface treated. The brush-discharge obtained by induction, when the test-tube is in position, is very smooth and mild, and at the same time effective. There is a marked difference in the sensations produced from the opposite poles when administering the brush discharge from the static machine. The discharge of negative insulation (the patient insulated and connected with the negative side of the machine) is less irritating to the patient, and, so far as observed, of a uniform violet color. The discharge from the positive, on the other hand, is very irritating, and is characterized by a mingling of violet and other discharges, which appear yellow in the light, but in a darkened room are distinctly green. The therapeutic indications for the choice of these discharges, so far as we know, have not as yet been pointed out, but furnish a field for investigation of particular value, we believe, in dermatology.

A more extended discussion of this important subject will at present add nothing of interest to this chapter, which in a general way includes the whole field, the principles involved being applicable to the affections in general. In a closing chapter on the therapeutics of the Roentgen ray other features will be considered.

EPITOMES.

TREATMENT OF PORT-WINE STAIN BY X-RAYS.

Jutassy (Fortschritte auf dem Gebiete der Röntgenstrahlen) reports the cure of a case of port-wine stain covering the whole right side of the face in a man of twenty-two by the X-rays. A small part of the cheek was exposed at first, the rest of the head and face being protected by a lead mask. A month afterwards the exposed part of the nævus was paler than the rest. A larger area was then exposed, and on this occasion the epidermis was detached, exposing the corium. The sore was two months in healing, but then the nævus had entirely disappeared, and in its place was a smooth white scar. A year and a half later the skin was normal in the greater part.

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THORACIC ANEURISM.

In the Edinburgh Medical Journal (March, 1901) Dr. H. Walsham claims that in no class of disease is the employment of the Röntgen rays more promising than in the diagnosis of thoracic aneurism. In those not rare cases in which thoracic aneurism is suspected, and yet no physical signs are available, it seems clear that this method of diagnosis may be very helpful. Cases are brought forward in which it was impossible by physical signs to make the diagnosis of aneurism, and yet, when the rays were made use of, the abnormal condition of the aorta was perfectly obvious.

It is pointed out that unless proper apparatus is employed no satisfactory results can be anticipated. The coil must give a 12-inch or even 14-inch spark, and with large coils the danger of the skin being burned is entirely obviated, the exposure being too short for the setting up of a dermatitis.

DEMONSTRATION OF HIP-JOINT BY X-RAYS.

Dr. J. K. Pickford: A good 8-inch spark coil, with suitable condenser, and worked with a rotary mercury break and 24 volts, or with the Welmelt interrupter with a 100-volt circuit, will give excellent results, either on the screen or upon a photographic plate. 1. The hip-joint in an adult is never seen very satisfactorily on the screen, even with the largest coils, and photography has to be resorted to in these deep structures. 2. An 8-inch coil, worked as above, will show the thorax on the screen satisfactorily.

THE ELECTRIC ARC.

Cleaves (Journal of Physical Therapeutics), after seven and one-half years' experience with the electric arc, places great confidence in it as a therapeutic agent. The result of experimentation and clinical work shows that it is the high-frequency or chemic rays which have the power to destroy bacteria and to cause dilatation of the capillaries with corresponding circulatory changes and increased nutritive activity. In treating lupus or carcinoma, the desired effect must be produced by the maximum of chemic activity, which means a maximum of the very high frequencies. The effect of the electric-arc bath is not confined to the action of high-frequency waves alone; the low-frequency waves, as well as the ozone which is generated, play an important part in nutritive change. From the administration of the electric-arc bath the author has noted the establishment of circulatory changes with a uniform regulation of the heart's action, as evidenced by improved volume and slower pulse rate, the augmentation of the temperature, increased activity of the skin, fuller and slower respiration, with gradually increased respiratory capacity and diminished irritability of the mucous membrane with lessened discharge in those patients suffering from catarrhal conditions of the nasal passages, and in tuberculous, bronchitic, or asthmatic patients. In diseases of the respiratory system a soothing effect upon the mucous membranes is always experienced, while cough and expectoration are diminished.

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ATROPHIC RHINITIS.

In the Amer. Med. Ass'n Journal, March 16, 1901, Carolus M. Cobb, M. D., speaking of the treatment of atrophic rhinitis by electrolysis, summarizes his conclusions as follows:

1. Electricity has a curative action in atrophic rhinitis, in so far as it stops the tendency to crust formation and the odor in typical cases.
2. It does not stop the discharge or the odor, if these are caused by nasal empyema.
3. That better results are obtained if the needles are placed comparatively near together.
4. That it makes no difference in the result what metal is used for needles, and it therefore follows that the diffusion of the copper salt is evidently not the curative agent.
5. That the improvement in the condition of the nasal mucous membrane is most noticeable in the area around the positive pole.
6. That this improvement is probably due to the liberation of oxygen and chlorine, and the chemical change resulting from the presence of free oxygen and chlorine in the tissues, or the acid reaction produced thereby.
7. That the needle of the negative pole should not be placed beneath the membrane of the septum.

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